EQUIPMENT SUPERINTENDENT

The man responsible for the selection, performance and availability of his company's diesel equipment

July 1961

FLEET • CONSTRUCTION • INDUSTRIAL

this month's

EQUIPMENT SUPERINTENDENT

TED L. FREELE

Vice-President—Maintenance, Schwerman Trucking Co.

Formerly diesel power

TEXACO DIESEL DATA

HOW TO SPOT FUEL INJECTOR PROBLEMS

The fuel injector is a most important and complex part of a diesel engine. The effects of a badly adjusted fuel injector can run all the way from increased fuel and lubricant consumption to ring and bearing failures.

Here are some of the characteristic symptoms you'll get if your fuel injector is acting up, and what the most likely cause of each symptom is.

1. Symptom: Heavy black smoke at exhaust; loss of power; rough idling.
Probable Cause: Incomplete combustion, due to worn injector nozzle.

2. Symptom: Rough, noisy engine; stuck or broken rings; bearing failure in most severe instances.
Probable Cause: Pre-ignition, resulting from premature fuel injection. Causes extreme high temperatures and pressures in combustion chamber.

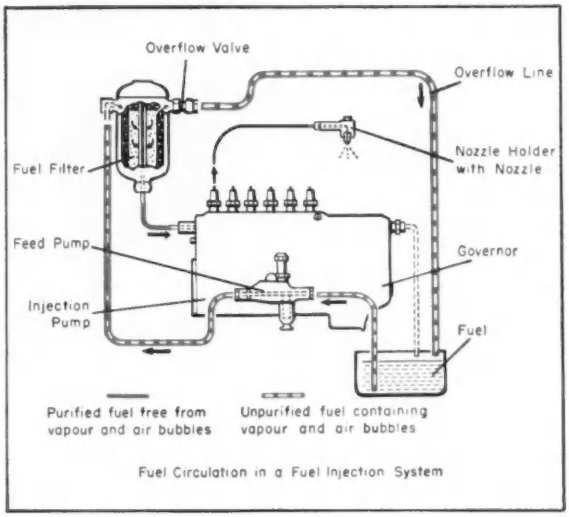
3. Symptom: Smoky exhaust; heavy soot deposits in engine and crankcase oil.
Probable Cause: Incomplete combustion due to late injection.

4. Symptom: Premature ring wear in some cylinders, heavy varnish formation in other cylinders; engine sounds uneven under load; white or light-blue smoke when engine is idling; dilution of lube oil.
Probable Cause: Improperly equalized injectors, which pump too much fuel into certain cylinders, starve others. "Over-fed" cylinders do most of the work.

Some of these symptoms can be cured with a comparatively minor adjustment; others require more involved techniques.

Improperly equalized injectors, especially on large engines, can be double-checked by a speed-drop test. This involves cutting out one cylinder at a time while you're checking the engine speed with a tachometer. The speed will fall off the most when you cut out the cylinders that are getting the most fuel.

Some folks try to get more power out of an engine by injecting more fuel than the engine was designed to take. You do get more power this way, but it's at the expense of your rings and bearings, and the exhaust becomes excessively smoky. The following chart shows the increase of ring temperature and exhaust smoke on a 4-cycle diesel experimentally overloaded with fuel:



Fuel Circulation in a Fuel Injection System

Fuel/Air ratio	% rated load	BMEP	% exhaust smoke*	Ring groove temperature
.03	67	51	7	336
.04	100	76	7	372
.05	112	85	16	396
.06	114	87	69	402
.07	113	86	92	397
.08	111	84	97	388

*Smokemeter reading.

Because a fuel injector is as carefully built as a good watch, it's best to let your manufacturer's service orgánization help you out with maintenance and repair problems. The most valuable type of preventive maintenance the diesel operator can do is to keep the injector clean. That means no disassembling of the unit in a dusty or otherwise contaminated atmosphere. It also means that you must use nothing but *clean* fuel. Contaminated fuel can ruin a fuel injector nozzle within a few days. You have to be particularly cautious if your injector isn't equipped with a dependable fuel filter. Water in the fuel is objectionable too, not only because it gives uneven engine operation but because it promotes corrosion of valve parts.

Fuel injector problems are best handled by trained experts. The same is true of diesel fuel and lubrication problems. Texaco has many, many years' experience in fueling and lubricating diesel engines of all sizes, in all types of operations. If you're having a problem with diesel fuel or lubricants, contact Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

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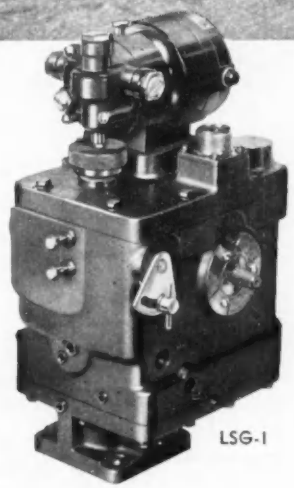

LSG-1

LSG-10

Woodward LSG load and speed sensing Governors are meeting the critical power control requirements at U. S. defense installations both here and abroad. Diesel engines driving the generators that supply power for the electronic computers and data processing equipment at missile launching sites, SAGE bases, DEW and BMEW radar stations are under complete and dependable Woodward Governor Control. The LSG combines the rapid response of electric load sensing with the reliability of conventional speed governing — this in a unique arrangement assuring continued satisfactory performance even in the unlikely event of failure of the load sensing circuitry. Governor response is so rapid that, on most diesel engines, the fuel pumps are in a changed position before the next cylinder has received its charge of fuel.

The reliability and ease of operation that has characterized Woodward Governors for over 90 years can benefit your engine or turbine installation too. Write today for complete information about the new Woodward LSG Governors.

D-104

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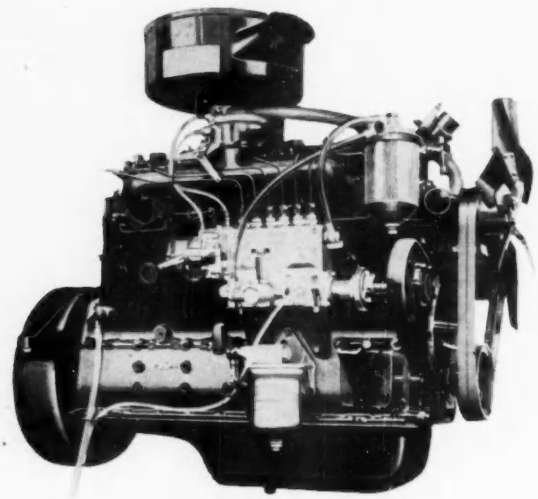

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Diesel engines (52 to 230 H.P.) for mounting on marine boats, generators, industrial equipments and conversions.

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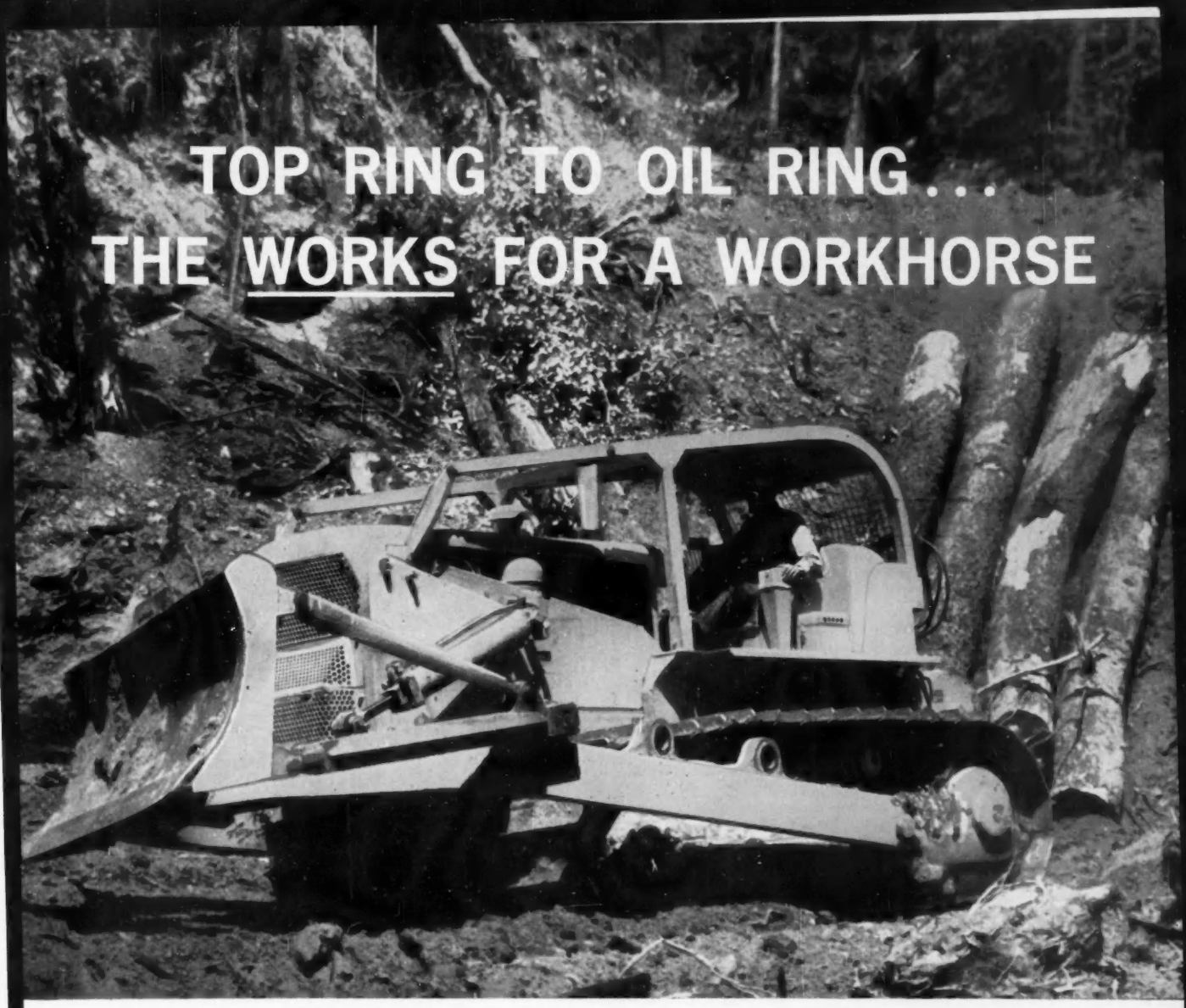
For more information write in No. 701



Koppers supplies packaged piston ring set for Caterpillar's husky D8 crawler Tractor

Extra stamina is demanded of every part of Caterpillar's massive D8 Tractor because it's built to push or pull the heaviest loads over the roughest terrain. This "something extra" is evident in the D8's powerful 235 HP turbocharged diesel engine—complete with packaged piston ring sets by Koppers.

Says Caterpillar: "The D8 Tractor is designed to excel; built to last. Take its 235 HP engine, for example. A 20% torque rise provides excellent lugging characteristics to meet critical loads. It's designed specifically for hard work, with dependability, economy and low maintenance. The Koppers rings we are using meet our requirements of quality and dependability."

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That's a completely Koppers ring equipped piston you're looking at. From the precision lapped, chromium plated, high strength alloyed iron compression ring in its top groove to the chromium plated, conformable, spring loaded, ventilated oil ring in the bottom groove. This set-up guarantees fast break-in and longer life resulting in peak efficiency for Caterpillar's 235 HP diesel engine.

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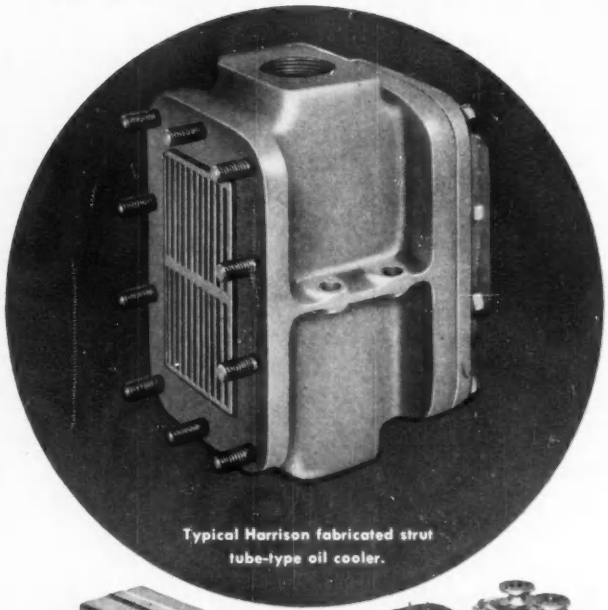
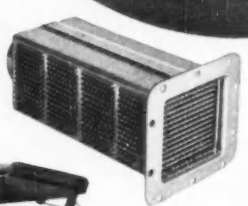
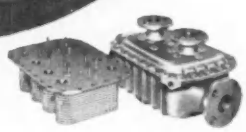


Typical Harrison fabricated strut tube-type oil cooler.





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The man responsible for the selection, performance and maintenance of his company's diesel equipment

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Executive Editor	Len Griffing
West Coast Editor	Paul B. Harder Parsons Building Pacific Grove, Calif.
President	James E. Jones
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Circulation Fulfillment Mgr.	Adele Hoppe
Production Mgr.	W. B. Williamson
Art Director	Leonard Wahlgren
Representation	
Mid-West	Frank Wenzel, Mid-West Mgr. 605 N. Michigan Ave. Chicago 1, Ill. Rm. 206 Tel: MIchigan 2-5050
Ohio Western Pa. & New York	C. F. (Dick) Tope 12500 Shaker Blvd. Cleveland 20, Ohio Tel: 991-2856
Pacific Coast	Pugh & Rider Associates 404 Halliburton Building 1709 W. Eighth Street Los Angeles, Calif. Tel: HUbbard 3-0537
Great Britain Scandinavia and Continental Europe except Germany	John Ashcraft 9 Curzon Street London, W. 1, England
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BPA

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GET THE INSIDE STORY on those $1.95/$2.05/$2.25 "WILFIT" 750 size packs

they may look good but there's a big difference in what goes into them!

Most bargain oil filter replacement packs have two things in common—they're built to fit Luber-finer units and they shout about prices. But there's a big difference in what goes into them and how effective they are in keeping lube oil clean as compared to a Luber-finer filter pack.

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   4,000- 7,000 miles
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6. **Luber-finer gives you** clean oil all the way—extends oil change intervals, cuts maintenance cost.

Yes, the genuine Luber-finer DIESELPAK costs a little more but ask yourself if your $8,000 to $9,000 engine isn't worth the best.

Before you decide to buy packs on the basis of initial cost consider the fact that Luber-finer will give you clean oil all the way at an additional cost of about 2/10 of one mill per mile. If you figure your maintenance cost on a per mile basis the $3.75 you spend for the Imperial DIESELPAK will give you the most economical replacement pack you can buy.

Write for complete information.

Luber-finer®
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Dept. D-71.
2514 So. Grand Ave. Los Angeles 7, Calif.

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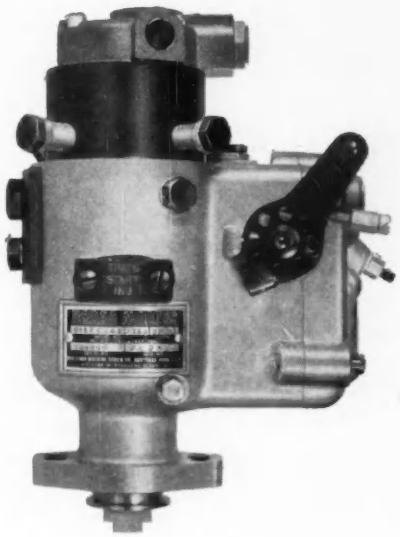

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Roosa Master's revolutionary design has made a most significant contribution to the diesel industry. Roosa Master has helped increase engine speed. Roosa Master accessories have helped solve engine manufacture problems. Simplicity of design saved space, lowered costs, and led to progress in diesel engine manufacture. Let us show you how Roosa Master can contribute to your new engine design. Hartford Machine Screw Company, Division of Standard Screw Company, Hartford 2, Connecticut.

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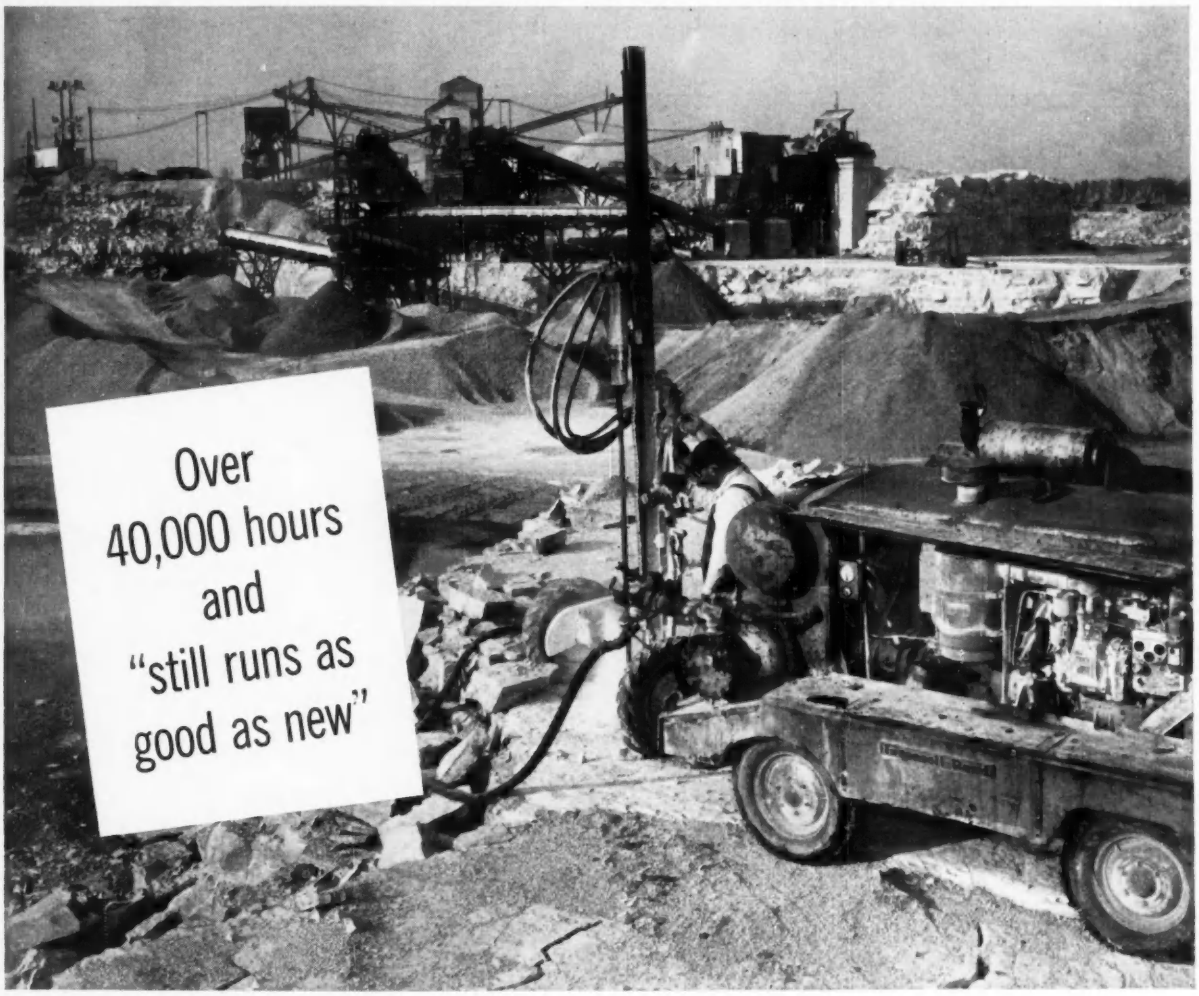
GET REAL PRODUCTIVITY—GET A GM DIESEL



One look will tell you that this Ingersoll-Rand 315 Gyro-Flo compressor has had to work for a living.

And worked it has!

For over 9 years it has been on the job day in, day out, supplying air for drills and hammers in the Halquist Lannon Stone Company quarry near Sussex, Wisconsin.

In those nine years this GM Diesel powered unit has racked up over 40,000 hours—*been overhauled only twice* at approximately 18,000-hour intervals.

Mr. A. C. Halquist says, "The GM Diesel 3-71 in this compressor has had only minor adjustments in addition to two overhauls and still runs as good as new. It's one of the best pieces of equipment we ever bought."

If that's the kind of profit-making productivity you want from your equipment, specify a GM Diesel engine when you buy or repower. There's a model of the proper size and output for nearly every type of construction equipment.

For details see your GM Diesel Distributor* or write direct for your copy of the new booklet, "2300 Applications of GM Diesel Power."

**Listed in the Yellow Pages under "Engines, Diesel."*

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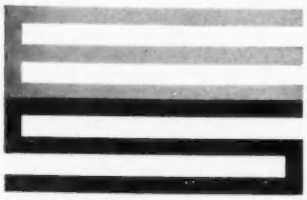


EDITORIALLY SPEAKING

What's in a Name?

Sorry to disagree with you, Mr. Shakespeare, but we think that there's a lot in a name. But then, you never wrote for trade magazines. For 39 years now we have published a magazine serving the diesel engine manufacturers and users. Through these years, the editorial concept has changed many times to best suit changing needs. When our name no longer reflected what we were doing editorially, we changed it. There have been three changes. Now, there's to be another. And, Bill, the reasons are very valid. Let's put it this way — if you had something that looked like a rose and smelled like a rose but called something different, you'd be smart to call it a rose.

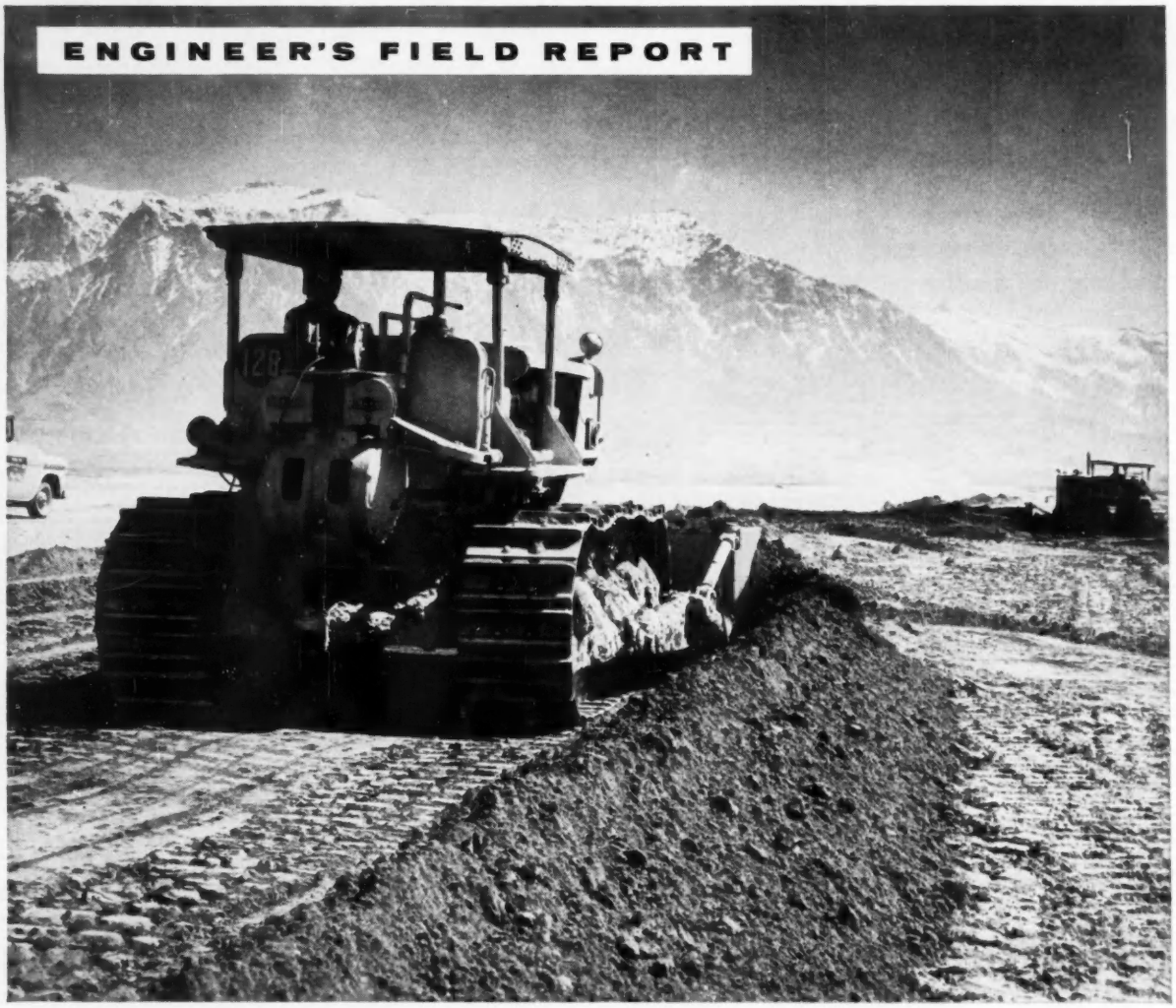
This would create an accurate "image", an area of identification, and people would know what you were talking about without a lot of explanation. While disclaiming any horticultural comparison, we're in this situation right now . . . the principle applies. The field we serve has changed radically through the years and rapidly in recent times. Our editorial concept has kept pace. We've chosen EQUIPMENT SUPERINTENDENT as an all-embracing title for a definite job function. The man's actual title might vary; he may be and frequently is a company officer; but his job is to see that his company's diesel-powered equipment is kept running and running efficiently. He's typified by our former series, "Today's Dieselman", now "Today's Equipment Superintendent". He's a man that's growing in stature as a key member of the management team.

He buys or strongly influences buying. He has responsibility for a fleet of trucks, perhaps a construction equipment fleet or a number of industrial engines. Until we started serving his needs he had no trade magazine of his own; he got only little bits and pieces from the vertical magazines serving his particular industry. Some 16,000 of these men have been reading our magazine to fill this vacuum. Also, well over 5,000 engine and equipment manufacturers and their distributors read the book because of their interest in these men and the fact that our channel of communication is a two-way street.

Yet some equipment supervisors do not read the book because they haven't identified "Diesel Power" with their jobs. That's why the name-change, Bill. There'll be no big change in editorial direction; we're already serving these mens' needs. We will, however, broaden our coverage to include his whole field of interest — in short, the whole piece of diesel-powered equipment. We started this by expanding into driveline components some time back.

So you see, Bill, a name means a lot to us. We wanted one that would immediately identify us with the important job that we're doing. It's sort of like what that other fellow said about not hiding ones light under a bushel. We feel that our new name will get rid of the bushel and let our light shine clear for all to see.

B.P.E.



RPM DELO Oil helps move ten million cu. yards of earth fill at Willard Dam

Willard Dam and Reservoir, located near the mud flat shores of the Great Salt Lake, will be enclosed by a 17-mile earth embankment with a maximum height of 35 feet. This giant earth-moving project, under the supervision of the U.S. Bureau of Reclamation, is a real test for equipment . . . and for RPM DELO Oil.

Tractors and Drag-lines of Geo. M. Brewster & Son, Inc., work ten hours a day moving peak loads of mud and grit. Yet, despite long hours of continuous operation under extreme conditions "RPM DELO" eliminates lost time due to lubricant failure.

"We use RPM DELO Oil exclusively in all our diesel and heavy duty gasoline equipment," reports Jim Udall, master mechanic on the project. "Engine parts remain clean and in good condition. We get up to 3500 hours between overhauls on our D-8's, have had no trouble on our Euclid trucks. We've used "RPM DELO" for over three years with excellent results."

RPM DELO Oil reduces wear and prolongs engine life because it clings to parts whether the engine is running or idle . . . hot or cold. Piston rings stay free because an anti-oxidant fights gum and lacquer formation and a special detergent keeps parts clean. Other additives prevent corrosion of bearing metal and crankcase foaming.

Why not try RPM DELO Oil? Chances are it can cut your costs, lengthen equipment life. Just call your local representative or write any company listed below:

LUBRICATING OILS RPM DELO

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • **STANDARD OIL COMPANY OF TEXAS,** El Paso
CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey - Denver, Colorado

TRADEMARK "RPM DELO" AND CHEVRON DESIGN REG. U.S. PAT. OFF.

For more information write in No. 707

HIGHLIGHTS

ARMY CONTRACT FOR S-P AND CONTINENTAL

Studebaker-Packard has been awarded a $21.4 million contract to supply heavy-duty trucks to the army. Engines will be produced by Continental Motors on a $10.7 million contract for 140-hp 6-cyl multi-fuel units to operate on kerosene, gasoline, diesel fuel, JP-4 jet fuel or a combination of these fuels.

A NEW DIESEL CAR?

The Leyland-Standard-Triumph tie in, whereby the two companies are now studying integration of their distribution and dove-tailing production, may result in another diesel-engined car.

PRODUCTION ORDER FOR TURBOS FOR 'COPTERS

Lycoming Div. of Avco has ordered a substantial number of AiResearch turbochargers as used on diesels for use on Bell's 47G-3B helicopter. Principal function of the turbos, on the Lycoming TVO-435 engine, is to maintain 260-hp rating to an altitude of 15,000-ft.

NEW DEVELOPMENTS IN THE DIESEL ARE BEING TESTED

Cummins reports that there are now running in trucks diesel engines of popular horsepower-sizes that are cast-iron; naturally-aspirated; lower in mean effective pressure and piston speed than current versions; equal in fuel consumption to the best achieved in the past; equal in bulk to commercial gasoline engines of the same power; and very close in weight per horsepower to the gasoline engine. Cummins points out that these engines are now under test, and will begin to appear on the road in new trucks sometime in 1961.

M-B SALES OF DIESEL-POWERED PASSENGER VEHICLES ON THE INCREASE

Bruce McWilliams, Mercedes-Benz vice-president, announced that sales of passenger vehicles equipped with diesel engines have increased substantially. In 1959, diesels were 7%; today they are 17.7%.

ICC DETERMINES CAUSE OF "RUNAWAY"

An ICC investigation of a down-grade "runaway" led to the ICC's urging "that drivers follow the practice of shifting to lower gears than may appear necessary when descending hills in order to cope with an emergency of this kind." Our suggestion: use a retarder.

MACK TRUCKS TAKES TO THE AIR AGAIN

Mack will use a nationwide radio program again this summer to tell of the trucking industry's contribution to the American economy, including the industry's substantial tax support of the nation's highway building program. This is good public relations.

PACIFIC FRUIT EXPRESS GOES "PIGGY-BACK"

PFE announced it is purchasing several million dollars worth of reefer trailers for its entrance into the piggyback rail field. These are expected to be in service by early fall. PFE has designated the trailers "Tempco-Van." Western growers will load with produce for the trip east; meats and other perishable merchandize will be shipped on the return leg of the trip. Union Pacific and Southern Pacific RRs are expected to receive the largest share of the carrying.

NEWS SECTION

"Mr. Earthmoving—
and his Brood"
Mr. R. G. LeTourneau, Longview, Texas industrialist was named recipient of three awards: International Progress Award by American Society of Tool and Manufacturing Engineers; 1961 Machine Design Award by ASME; and the Elmer A. Sperry Award for accomplishment in the field of transportation. Machines pictured have from three to eight rubber-tired wheels, boast a combined power of 8820-hp, are valued at around $2 million.

I-H—GM's for Ruan
Part of fleet of 152 I-H DCOF 405's powered by GM 6V-71's recently put into service by Ruan Transport Corp. Units shown are now operating out of Ruan's Madison, Wisconsin terminal.

Highest Volume of Sales
At Annual Meeting of Distributor Advisory Committee, a group of four leading central distributors of Roosa Master fuel injection equipment, Hartford Machine Screw presented a plaque to Stan Franklin, President of Diesel Control Corp. of Wilmington, Calif., in recognition of highest volume of sales on Roosa Master products achieved in 1960. Aim of the committee is to strengthen the entire service organization—presently, 80 central distributors and 300 authorized service stations—for the benefit of all concerned, including the user.

Industry News . . .

New Diesel Fleet

A new company, Road Builders Trucking Company, has recently been formed in Nashville, and has already taken delivery on 20 new GM diesel-powered tandem dumpers. Cost was approximately $400,000. Sale was made by General Truck Sales, Inc., area dealers for the division's products. Trucks, with four separate compartments for different-type aggregates, discharge these as needed into concrete paving machines, which in turn deposit the mixed concrete into forms for road resurfacing. General Truck Sales officials said, to their knowledge, this is the first use in this area of diesel-powered equipment as applied primarily to this phase of road equipment.

Master Service Award

Jean A. Parkinson of Arvada, Colorado, service manager of H. W. Moore Equipment Company, of Denver, has been awarded the Master Technician certificate of Melrose Technical Institute, service training center of International Harvester's Construction Equipment Division.

To qualify as Master Technician, Parkinson was required to have eight year's continuous experience on International construction equipment (including three years field experience), responsibility for shop administration for at least two years, completion of a minimum of 50 courses at Melrose Tech, and the presentation of at least 25 courses.

Crusher dust gets so thick you can't breathe . . . but

Donaclones deliver 99.9% pure air!

Now factory equipment on many leading makes of engines

Dust gets so thick around this ag limestone plant, it often hides the equipment. Diesel engines on crusher and hammermill used to require frequent overhaul with expensive downtime.

After Donaclones were installed, engines were operated according to the previous overhaul schedule and then examined. *They showed practically no signs of wear.*

The Donaclone's primary centrifugal cleaner removes 98% of the dust. Only 2% remains for the Duralife paper filter giving it an extra-long service life. And it can be renewed when necessary, by dunking in water and detergent.

Add years of engine life by modernizing with Donaclones.

Write for name of dealer

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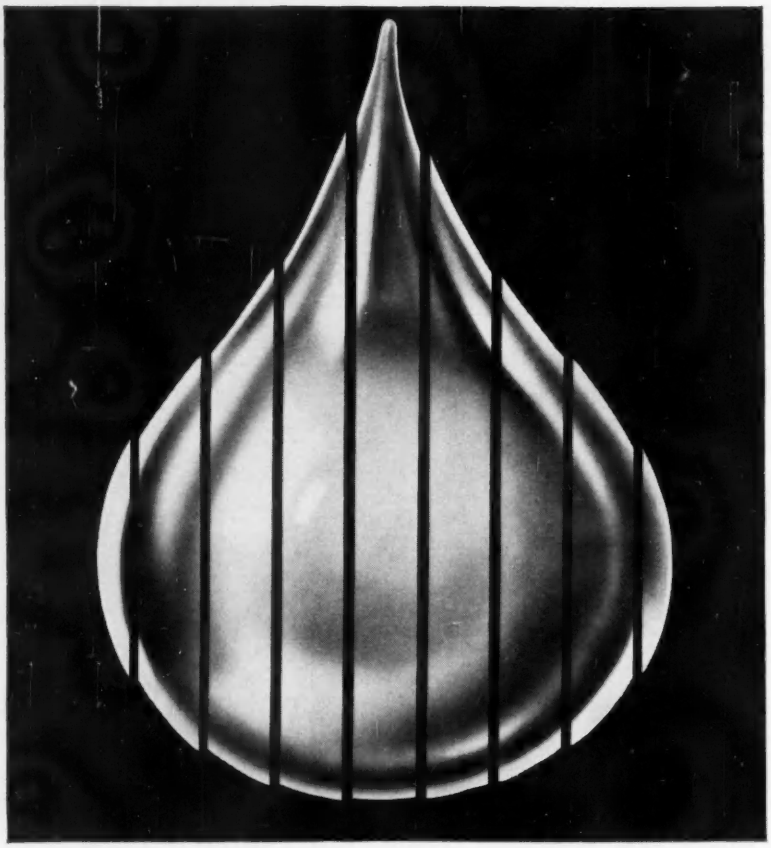

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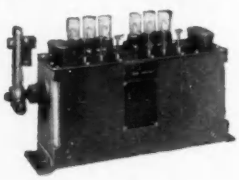

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Industry News . . .

Six in a Row

The City of Goodland, Kansas, owner of five Fairbanks, Morse diesel generating sets in its light plant, recently placed an order for a sixth. It is Goodland's biggest yet, a 3500-hp model AD 18 that produces 2500-kw. Engine is a 227-rpm dual-fuel unit.

Garrett Anniversary

The Garrett Corp. of Los Angeles celebrates its 25th year in business, its Silver Anniversary. Started in 1936 with a handful of personnel, it today employs 10,000 people in operations around the world. 5500 are employed in Los Angeles alone.

The company's primary role is in development of environmental controls for aircraft, however the Industrial Division is one of the leading producers of turbochargers for the diesel engine industry.

Maintenance Exposition

Executives of the nation's motor fleet industry attending the '61 Fleet Maintenance Exposition, October 23-26 in the New York Coliseum, have been assured that the accompanying technical sessions will provide them with new ideas for the profitable improvement of their operations. This exposition, sponsored by the Private Truck Council of America, is the only annual event of its kind designed exclusively to meet the many and varied maintenance needs of the nation's private for-hire carriers and government motor fleets. It is especially tailored for a highly-select audience composed of America's top fleet management and maintenance executives.

President's Trophy

The President's Trophy, highest tribute in the trucking industry for safety and courtesy on the nation's streets and highways, has been awarded to Pacific Intermountain Express (PIE). It is the second time in three years that PIE has received the trophy. It is presented by the American Trucking Association, Inc. for the best overall safety record in the industry the previous year (in this case, 1960).

"Good Maintenance, Key to Low-Cost Operation"

This will be the subject of the keynote address at the opening of the Fleet Maintenance Conference on Oct. 23, New York Coliseum. Other topic is "What Higher Speeds Mean to Maintenance".

Following day's session features panel discussions on "Instrumentation for Fleet Maintenance", "Refrigeration", "Mechanics and Instruments", "Supervisor and Management Training Programs" and "Tire Problems".

Following day's itinerary treats of "Maintenance: (1) ". . . in Power Train Components"; (2) ". . . in Electrical Components"; (3) ". . . of Bus Engines"; and (4) ". . . in Vehicle Cleaning". Afternoon session treats of "Maintenance Problems" in (1) ". . . New Truck Diesels"; (2) ". . . New Body and Frame Materials"; and ". . . Service Brakes and Retarders". After-luncheon address will be "Good Management, Key to Good Maintenance".

Arrange your schedule to attend, and if you've planned an exhibit there's very little space left.

Schoonmaker Supplying Diesel Sets 'Round the World

Columbia University has purchased vital vertical reverse reduction gears for use in the geological survey vessel of the Lamont Geological Observatory in Palisades, N. Y. The gear, supplied by A. G. Schoonmaker Co. will be used in conjunction with a GM 567A diesel engine on the survey vessel to be operated in Atlantic waters.

Schoonmaker has also furnished three 938-kva diesel generator units to the Aluminum Co. of America for shipment to their British Guiana plant. The fully portable units will be employed on a new hydro electric plant and a future aluminum reduction plant. Each weighs 77,000 lb. The special switch gear is manufactured by Schoonmaker and uses GM-EMD 12-567 and Elliott Company generators.

International Dairy Engineering Co. will use a heavy, continuous duty 400-kw diesel engine generator set for a new Foremost Dairies processing plant in Machiques, Venezuela.

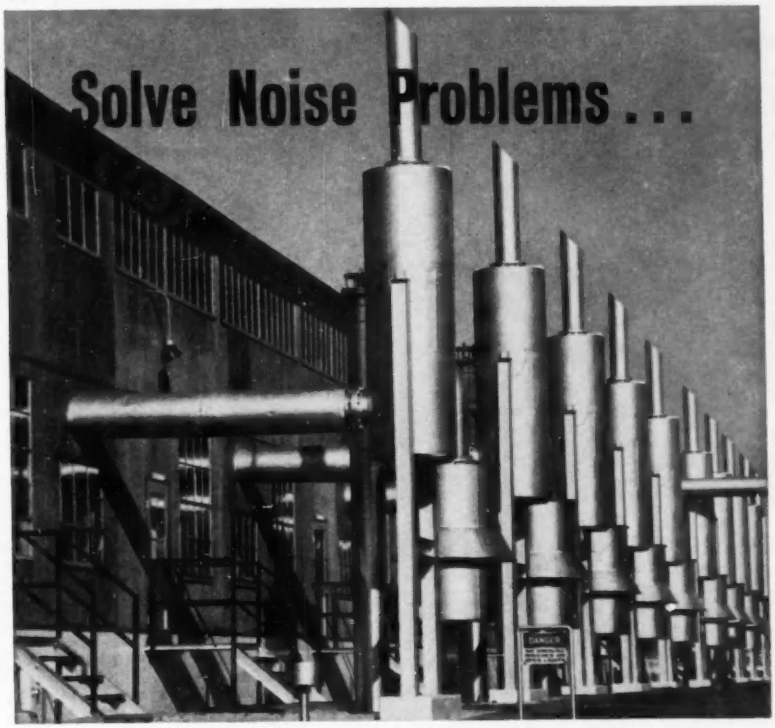
Cummins Engine to Establish Plant "Down Under"

Melbourne area of Australia is to be the locale for manufacturing facilities to assemble **Cummins Engines.** Cummins expects to produce the J and C line in the 70 to 175 hp range at first. All parts will be interchangeable with those now manufactured in the home plant.

The Australian facility will be the third overseas for Cummins. Others are in Shotts, Lanarkshire, Scotland, and Motores Cummins Diesel do Brasil, Ltda., a Brazilian subsidiary.

Contract to White

White Diesel Engine Division of White Motor Company has been awarded a $2.5 million (approximate) contract by the U.S. Corp of Engineers for 57 engine-generator sets to be used as standby power in the Titan II missile program. Contract includes an option for the purchase of 23 additional sets at a later date. Engines are supercharged 6-cyl Superior model 40-SX-6, rated 510-hp @ 900-rpm. Bore and stroke are 8.5-in x 10.5-in. Generators are 350-kw capacity.



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PEOPLE, PLANTS, PLACES

A-C Appoints Mgr

Douglas W. Erskine has been named manager of engine engineering at the Harvey (Illinois) works of **Allis-Chalmers Mfg.** He succeeds A. F. Ochtman, who retired July 1.

White Names Rep

George M. Woodman has been appointed sales representative, operating from the Houston office of White Diesel Engine Div. of **White Motor Co.** He will be responsible for the sale of Superior compressors and gas engine-compressor sets to petroleum, petrochemical and industrial markets.

GM Diesel Ltd. Names Coach Sales Rep

Don J. Kennedy has been named coach sales manager at **GM Diesel Ltd.** (Canada).

Waukesha Names Two VP's

F. C. Schulze has been advanced to vice-president, sales, for **Waukesha Motor Co.** Mr. Schulze had held the position general sales manager since 1949. In his new position, he will direct and coordinate Waukesha's sales effort throughout the country and in foreign markets.

A. Foster Sheller has been named vice-president, manufacturing. He will supervise and coordinate all phases concerned with or relating to manufacturing.

F. Schulze

A. Sheller

Eaton Acquires

Eaton Mfg. Co. announced its initial entry into the European Common Market as a prime manufacturer. Eaton has acquired for cash a majority interest in a newly organized Italian Company, Eaton Livia S.p.A., which has purchased the business and most of the assets of Officine Sant'Ambrogia S.p.A. of Turin. They were the largest independent manufacturer of automotive engine valves in Italy and one of the largest in the Common Market.

Autolite Names

Phillip G. Robinson has been named sales administrator for corporate sales of **Electric Autolite Co.** He will be responsible for coordination of divisional sales policies and programs, under direction of Earl R. Fiene, vice-president and director of sales.

N. Y. Manager

Edward B. Capliski has been named New York regional manager of the commercial sales division, **American Bosch Arma.** The branch is located in Roslyn, N. Y.

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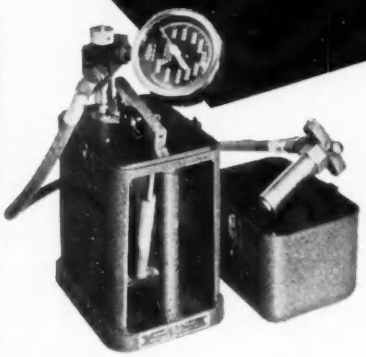

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Model UTS-10 portable Universal Unit Injector Test Stand. Adapters and Connectors for all diesel engines.

Model K-120, Universal Indicator . . . for high-speed automotive type diesels . . . can be adapted to larger engines for firing pressure readings.

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For more information write in No. 712

A-C Plant Nears Completion

Construction of **Allis-Chalmers** new engine manufacturing plant at its Harvey, Ill. works is nearing completion. Production is expected to be underway by July 1.

White Branches as Graymarine Dist.

White Diesel offices in Seattle, Portland and Ketchikan have been named authorized distributors for **Graymarine** engine sales and service in the Pacific Northwest.

Smith Changes Name

Smith Welding Equipment Corp. has announced a new corporate name. Smith Welding Equipment will become a division of **Tescom Corporation.**

Moore, Dearborn Chemical Sales Rep

Richard L. Moore has been named sales representative for **Dearborn Chemical,** Illinois-Wisconsin district headquarters at Des Plaines, Ill. He will service railroads.

Mr. Moore was a water chemist with the Illinois Central Railroad for five years.

M-H Names Sales Mgr.

Thomas M. Hoban has been named fleet sales manager, heavy-duty tractor div., by **Marmon-Herrington.** He will have complete responsibility for sales of M-H's new 14,000-class-over-the-road vehicles.

Tom Hoban

Woodward Governor's European Branch Expands

Woodward Governor Company's European branch, located at Schiphol, The Netherlands, started in 1955 as a one-man sales and service office. Today Woodward's European branch occupies over 5000-sq ft in a modern Dutch building on the grounds of the Schiphol Airport. And that one-man organization of five years ago has grown to 27 persons! They're engaged in providing European users of Woodward products with application engineering and complete maintenance and repair service.

American Bosch Rep

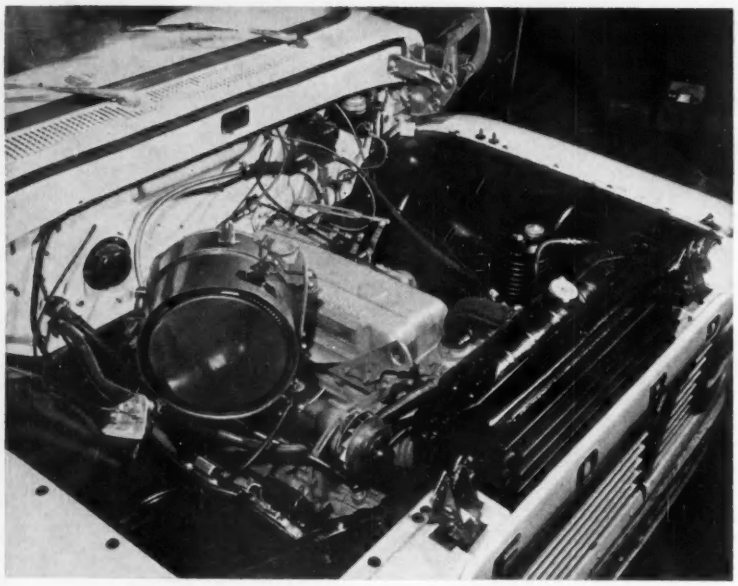
Richard Kachelmeyer has been appointed western region sales representative by **American Bosch Arma Corp's** commercial sales div.

Winslow Appointments

Winslow Engineering and Manufacturing Co. has appointed **John R. Bacher** Manager, Service and Applications, in charge of product service throughout the U. S. He has been with the company 14-years.

Announcement has also been made of the appointment of **John A. Vollstedt,** Sales Engineer in the Oakland office.

Cecil A. Grey was added to the sales staff, operating out of the Birmingham, Ala. office and **C. E. Barney,** to represent Winslow in the Rocky Mountain area.



GM 4-53 diesel engine fits neatly under hood of Ford F-750, taking place of the original gasoline unit. Note compactness of Donaldson's dry-type filter, which allows underhood installation.

"Streamlined" Repowering

Repowering volume has built experience . . . engines go in quicker, jobs are better, costs are lower.

It's no surprise that the diesel engine's new frontier is in the light-to-medium-duty truck field. In fact, it is in this use that the operating economies of the diesel engine are more immediately obvious, by its lower fuel consumption at low-load and at idle, and by drastically reduced maintenance costs in commercial service. Because of this, more medium-duty trucks are being repowered than ever before. As additional incentive in this direction, cost of the conversion is continually going down.

Since many engine distributor's shops are making repowering a bigger part of their overall operation, what started out as "custom" work is now practically standardized. With this relative standardization, fewer manhours of labor are needed per conversion. Every shop has acquired a backlog of information that makes the solution of a new problem a matter of applying lessons already learned. And, fewer and fewer problems seem to be cropping up. For those that do, there's a ready answer.

One Shop's Experience

Take Interstate GM Diesel of Minneapolis as an example. Interstate has completed more than 40 repowering jobs, with new ones added every week. They have learned most of the answers. Recently, for instance, when a Ford F-750 came in for a diesel conversion, experience dictated choice of engine, cooling system modifications, gearbox suitability, engine and transmission mount modifications—everything required for an easy and a serviceable installation.

Here, Interstate recommended the GM 4-53 engine. This unit develops 130-hp @ 2800-rpm, with 271-lb/ft torque @ 1500-rpm—plenty of power. Yet, the "Jimmy" is a relatively compact engine for its output, meaning that there was enough room under the hood to fit it in without body or frame modifications. Elimination of such work is reflected in cost.

Repowering in general is being helped along by the development work of accessory suppliers, who are constantly making their products do a better job in less space. In this installation, the air filter required by the "Jimmy" is considerably larger than that of the original engine. Though the engine fit easily into the available space, exact air filter location presented a problem. Since an outside-the-hood installation would have required plumbing, Interstate preferred to keep the filter under-hood, if a suitable unit could be found that was small enough.

Donaldson's recently-introduced model EDG "Duralife" filter solved this problem. The unit is small enough to fit into the space between the engine and the wheel well. The element was designed for maximum engine protection under moderate dust conditions. Also, the dry-type element is chemically treated to prevent swelling of the filter paper when engine is operated in rain or humidity. In fact, Donaldson recommends that the element be serviced by washing it in water and a non-foaming detergent. For this installation, the "Duralife" unit worked out as well as a custom-made unit. And, similar units are available from Donaldson for 3- and 6-53's, as well as Series 71's.

Results

How are the repowered units working out? Reports from users predominately indicate that results are highly satisfactory. They are experiencing lower operating costs and reduced downtime. Fuel cost savings are amortizing the original investment at a rapid rate—more rapid, in fact, than many had expected. These reasons, along with quicker and lower-cost installation can only add impetus to the trend toward repowering.

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AP. 130

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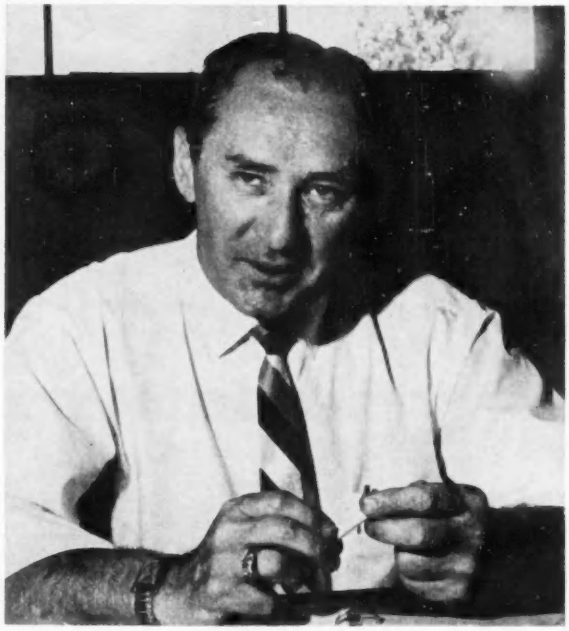
THIS MONTH'S EQUIPMENT SUPERINTENDENT



TED L. FREELE
Vice President—Maintenance
Schwerman Trucking Co.
Milwaukee, Wisconsin

Schwerman Trucking Company is one of the major bulk carriers in the country today, and has found that tying the ends of its maintenance operation together requires a high degree of administrative ability, as well as a thorough knowledge of trucking and maintenance.

As vice-president for maintenance, Ted L. Freele has responsibility for 752 diesels now in service, plus 50 additional new units ready for assignment. The 802 units are Macks and Cummins-powered Whites. In addition, there are more than 275 gasoline engine-powered units.

Background on Ted

Ted Freele's value to Schwerman Trucking Co. is based on experience in most types of job slots now under his supervision. Ted started his career in the trucking business with another carrier in Wisconsin, first as mechanic, then driver. When he made the change to Schwerman, the company was operating without a separate maintenance department. At this time the fleet was considerably smaller, and it was possible for fleet maintenance to be handled as a second function of the other offices. This system was still in effect when Ted was made dispatcher.

But as the company grew and continued to grow, fleet maintenance grew in importance until it was too big to be a "secondary" department. Ted was picked as Fleet Superintendent. As the fleet continued to grow, his job was recognized as a top-management function, and he was given the title Vice-President, Maintenance.

The Operation

Back in 1938, Schwerman was a pioneer in hauling bulk cement. Today, haulage is extended to asphalt and chemicals, but the biggest part of the operation is still bulk-cement haulage. Tank-type trailers are used, with provision to unload under pressure. Each tractor has either a rotary air-blower or air–compressor (operating from a gear box PTO) that blow the product through a 4-in. pipe into the receiver's storage.

This provides both shipper and user advantages of reduced storage, flexibility because of rapid delivery, and exactness of delivery time. But it places the burden on Ted's fleet.

"The timing of our operation is fierce. Downtime on a single unit is murderous, and we can't tolerate a breakdown. It effects the schedule of our customers. Take a paving contractor, for example: Men and expensive equipment would be standing by, idly, unless he gets his materials. He may be on a project with a deadline, even one with penalty clauses. Or, he may be on a 'slip-form' job where once the concrete starts to flow it can't be stopped until the job is finished."

Ted L. Freele keeps the entire fleet on the line with a system of PM, scheduled maintenance and a system of component exchange.

Preventive Maintenance

Terminals are located strategically to service the fleet franchised to operate in 37 of the eastern and midwestern states. PM is done at each truck's home terminal. Since trucks operate close to home, they are always available for scheduled PM. PM procedures are established by Ted, determined on the basis of "no-breakdown-tolerable". Inspection and regular service are thorough, for according to Ted's experience, ". . . breakdowns are inversely related to PM. The better the PM, the less trouble."

Because of this, Ted would rather lean toward over-maintenance than toward under-maintenance. For example, suppose a transmission had to be dropped to get at a bad clutch. The due-date on the gearbox would be checked, and if it were reasonably near, the transmission would be changed out.

The Macks receive oil and filter change at 3000 miles. Full-flow filters are standard, and Ted stays with

Ted's fleet consists of 802 Macks and Cummins-powered Whites, plus 275 gasoline engine-powered units, though gasoline engine purchases were halted several years ago. Tank-live trailer is special rig for carrying bulk cement, unloading it at site by pressure from either of two compressors mounted on tractor, powered by gearbox power takeoff.

them. The Cummins have a larger capacity crankcase, also use full-flow filters, and Ted has found that the larger capacity stretches oil and filter life to at least 6000 miles. He is now about to push this up to 8000 miles.

This judgement is backed up by used lube-oil analysis data. As a generality, Ted specifies a Series I oil. Most of this lube oil analysis is done by one of the oil companies which are contracted to supply Schwerman lubrication requirements.

Ted considers air filter servicing essential. Macks are fitted with oil-bath filters, while the Cummins use dry-type. Ted feels that the dry-type is more effective, but requires more maintenance. Mack oil baths are cleaned at 3000 miles, at which time the filter screen and pan is thoroughly cleaned. Dry-type filters are scheduled for the same mileage but are frequently pulled sooner for cleaning or replacement. This usually occurs when trucks must operate in "dirty" atmospheres, and the usual symptoms of a plugged air filter are loss of power and some smoking.

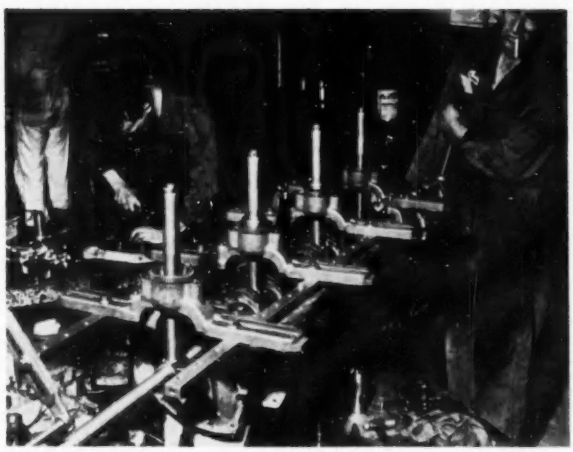
"We've had drivers call in to complain about smoke. Since a truck can never be more than 150 miles from home, we tell the driver to remove the element and bring the truck in. It's not always the filter. Every once in a while, we find a fuel return line on the Cummins that 'accidentally' got pinched off. Overfueling can cause smoke, too."

Routine repairs are done at home terminal, too—valves, nozzle replacement; but heavy rebuild is done at the two repair centers. Milwaukee services the western states; York, Pa., the eastern terminals. Local terminals keep their required stock of replacement items, such as filter elements and gaskets. When a component, such as starter of generator, is swapped out, it is then exchanged for a serviceable unit from the appropriate main shop.

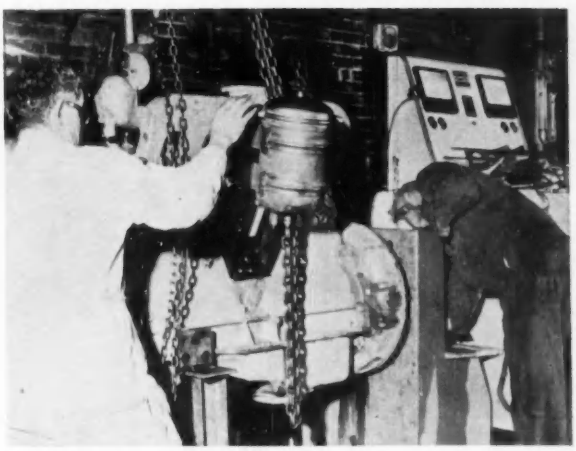
Brake work is also done at terminal level.

Inventory and Unit Exchange

Since the fleet is standardized maintaining stocks of units, parts and supplies is simplified. Requirements



Kwik-Way line borer operates on the bottom end of a Mack in the Milwaukee rebuild shop. Tired engines are swapped out at home terminals, exchanged for rebuilt engines from central depot by a van



that makes a weekly circuit. Before leaving the main depot, "Curly" Valerio (left) shepherds each engine to Clayton dynamometer for six hours of run-in, final checkout before delivery to branch terminals.

are ordered by the terminal manager. Ted specifies major purchases, makes them available through the two main depots. With this exchange system, specialists can be kept at two locations, where there is sufficient work flow to justify specialization and specialized tooling.

Milwaukee and York rebuild everything from engines to axles. They have complete facilities with few exceptions. It is uneconomic, for example, to go into magnaflux and crankshaft grinding. These are farmed out.

The Milwaukee Shop

The shop is separated into areas of specialization, with the parts section close at hand. Auxiliary units, such as product air compressors, are also rebuilt here.

The two repair centers also recap the fleet's rubber, devoting a large storage section to the stock of tires and the two electric recapping units. Mileage averages about 50,000 miles to a new tire, and pretty close to that on a recap. Fleet average is between two and three recaps per tire.

The Mack engines have been in service for quite a while, many going back to 1956. They average 200,000 miles before overhaul when new; thereafter, the period is reduced to 150,000 on rebuild. The Cummins, which are relatively new to the operation, are scheduled for 200,000 mile rebuild. Schwerman Trucking Co. started buying the Cummins in 1959, which is when they stopped all gasoline engine purchases. As Ted L. Freele says, "Diesels are a better truck for our operation. We sell service."

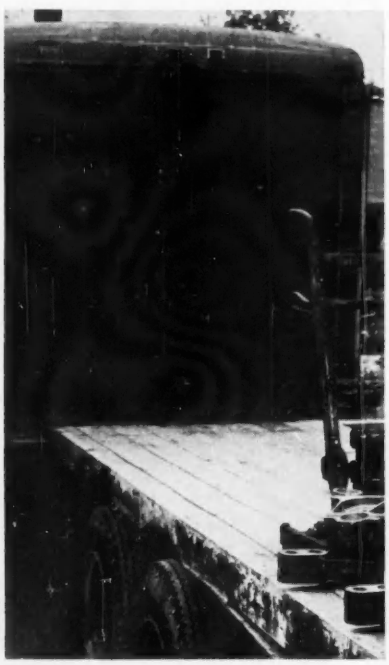
Shop Foreman Jack "Curly" Valerio shepherds each piece of equipment through the rebuild shop, stopping occasionally at a line-boring or honing operation just to make sure. "Curly" also shepherds each rebuilt engine to the Clayton Dynamometer for run-in. Ten percent load is applied almost initially, then stepped up to full-load full-rpm. Run-in time is six hours. No time is lost in hook-up, with moveable hoist on hand, water connections, and exhaust couplings that take the waste and the noise under the floor and out of the shop.

Summary

In a big fleet, dollars spent on maintenance are one of the few cost cutters open to management. But as Ted points out, reducing maintenance increases breakdown, is more expensive than proper PM.

Within this framework of maintenance cost vs service dependability, Ted L. Freele has helped establish a smoothly functioning operation relatively free from breakdown. With rebuild done within the organization, quality control is constant and component life between inspections can be calculated. Teardown inspection periods are established with similar exactness.

Ted L. Freele typifies the modern equipment supervisor—efficient, knowledgeable, well versed in his job, and a member of the top-management team.



Once a week, a van loads up with parts and assemblies ordered by terminal managers, leaves each of the central depots to deliver, and pickup swapped-out parts for rebuild.

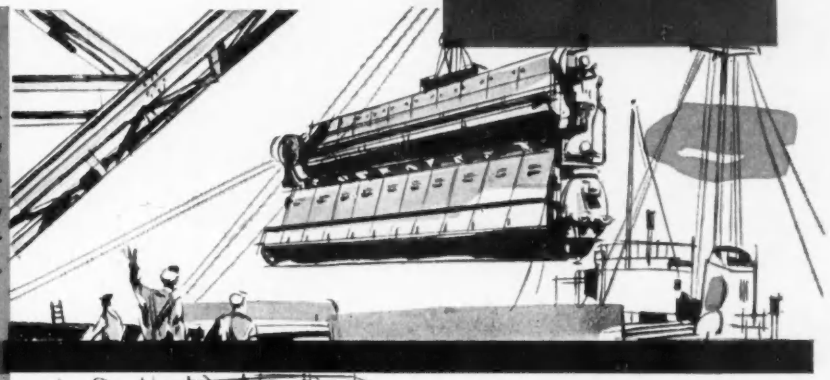
At each of the central depots, one in York and one in Milwaukee, parts counter is located adjacent to shop, reducing mechanic "trip times". Large inventory is kept at depots, including rebuilt units ready for shipment.

Separate department of shop is for electrical component rebuild. Because all rebuild is done at central locations, Ted Freele has the advantage of a steady work flow and a high degree of standardization.

M·A·N

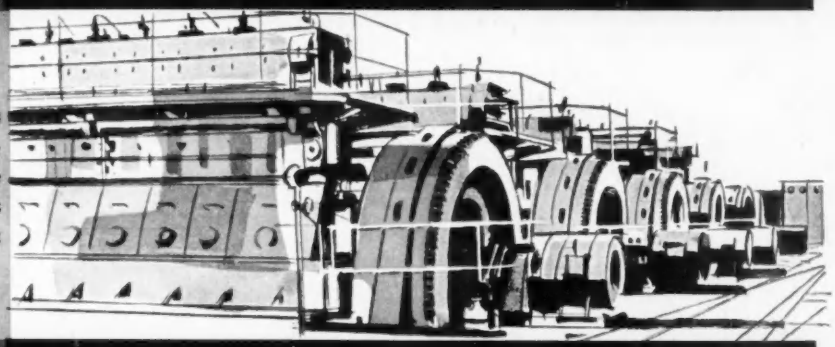
MARINE DIESELS

are built by M.A.N., the oldest Diesel engine manufacturer of the world, up to an output of 22,000 BHP. These four or two-stroke engines, of in-line or Vee design are turbocharged or naturally aspirated.



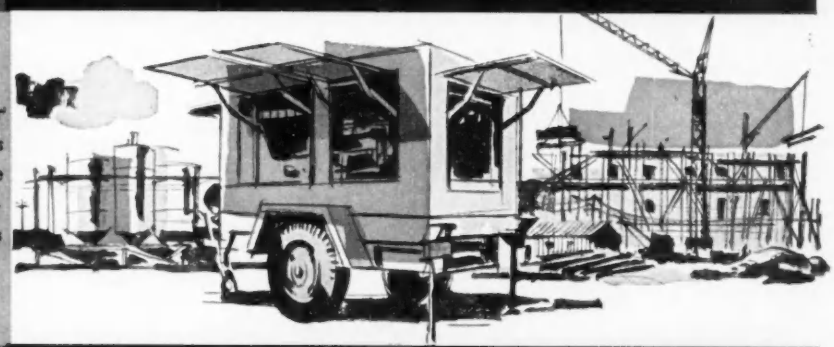
POWER STATIONS

with M.A.N. Diesel engines or gas Diesel engines require little maintenance. M.A.N. Diesels are reliable helpers for the drive of generators and pumps or for the exacting work in the drilling fields.



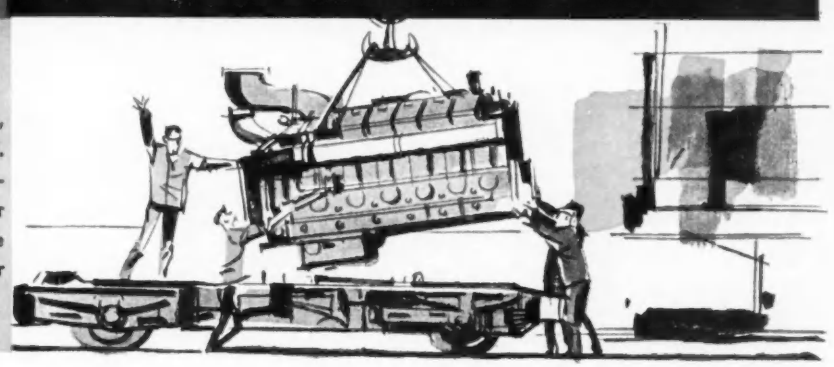
AT BUILDING SITES

perfect service of "mobile power stations" with M. A. N. Diesels starting immediately at low outside temperatures. Mobile Diesel three-phase sets are built for outputs from 14 to 140 kVA.



FOR INSTALLATION

in Diesel railcars and locomotives, cranes and special vehicles M.A.N. engines are provided for direct, hydraulic or Diesel-electric power transmission. M.A.N. have service bases and representatives all over the world.



MASCHINENFABRIK AUGSBURG-NÜRNBERG AG · WERK AUGSBURG

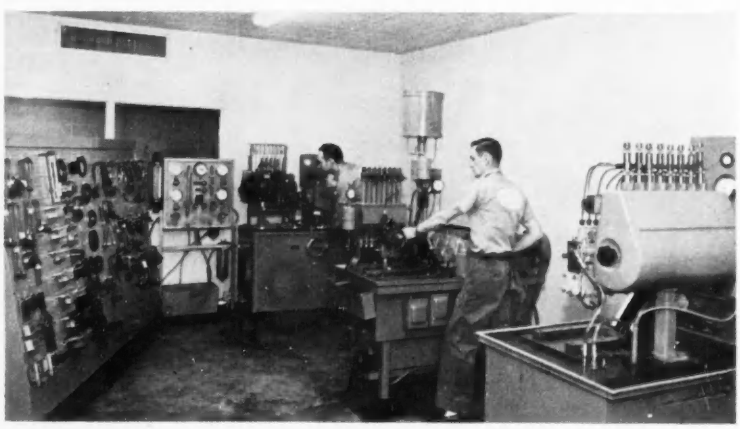
For more information write in No. 713

About 28,000-sq ft of floor space is devoted to showroom, office space, IBM inventory control, auditorium, work shops and storage. And there's still room for expansion.

Fuel Injection Shops get Bigger... Better

More diesels, more need for fuel injection equipment sales and service. Here's what this growth pattern has meant for one shop.

General fuel injection pump overhaul area. Layout is aimed at convenience for technicians. Note variety of special fixtures, for example, pneumatic clamp in first vise.



Pump calibration and testing is done in a separate room, half of which is shown. Other equipment includes "F"-type pump tester, run-in stands for unit injectors.

In 1948, Herb Wittersheim started Diesel Injection Sales & Service, Inc. in what is described as "a small section of the Tanner Warehouse Building" in Norfolk, Virginia. Early this year he opened this new headquarters office and shop. In addition, there are branch facilities in Richmond and Salem, Virginia; Raleigh and Charlotte, North Carolina.

This expansion is being repeated in varying degrees in many areas of diesel concentration. There's no intention here to detract in any way from the personal foresight, drive and work that resulted in this outstanding accomplishment but the volume of work must exist in an area before expansion on this scale is possible. The fact that it does exist testifies to the growth of diesel usage and corresponding expansion of facilities to service them.

It is this same pattern that produced the Association of Diesel Specialists of which Herb was a founder and its first president. This international group of top firms in this expanding area of fuel injection equipment sales and service has as its aim providing "accredited, dependable service" to the engine user. Diesel Injection's new facilities are aimed at doing just that on an ever broadening scale.

This shop also typifies another trend—one toward complete diesel service. Fuel injection equipment is intrinsic to the diesel engine and this shop contacts and is contacted by diesel users. It's logical that the operating concept should expand to include other lines of interest to users. Thus a diesel distribution system for parts, components, accessories and supplies is evolving.

This particular shop is a case in point. With fuel injection equipment sales and service as a focal point, Diesel Injection has expanded into many other lines of interest to diesel users. For example, they are distributors for Hartridge fuel injection test and repair equipment; they handle the Lister-Blackstone line of diesel engines; they're into engine and component rebuilding; they stock items from starting aids and filters, to diesel piston rings.

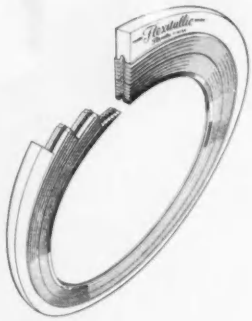
While perhaps only 40% of present business is in fuel injection equipment, it is this important service that attracts other business. This operating pattern works. Diesel Injection has grown from a small one-shop diesel specialty firm to a complete diesel service operation. Its five offices in two States have a payroll of about 85 people. And this has been done in 13 years!

Hartridge analyzer is being used (foreground) to prove out a reconditioned nozzle. Other tooling is for nozzle repair and testing.

Test room for hydraulic governors from bus and truck type, left stand, to railroad-type, center stand. Rear stand is for aircraft governors.

Engine and component rebuild area just getting under way. Blower rebuilding, including rotor balancing, is in progress. Engine dynamometer is within brick wall at left.

Customers' main contact with shop is over the functional, well-lighted service counter. Well-organized stock room, only partly shown, has display value in making known availability of different products.



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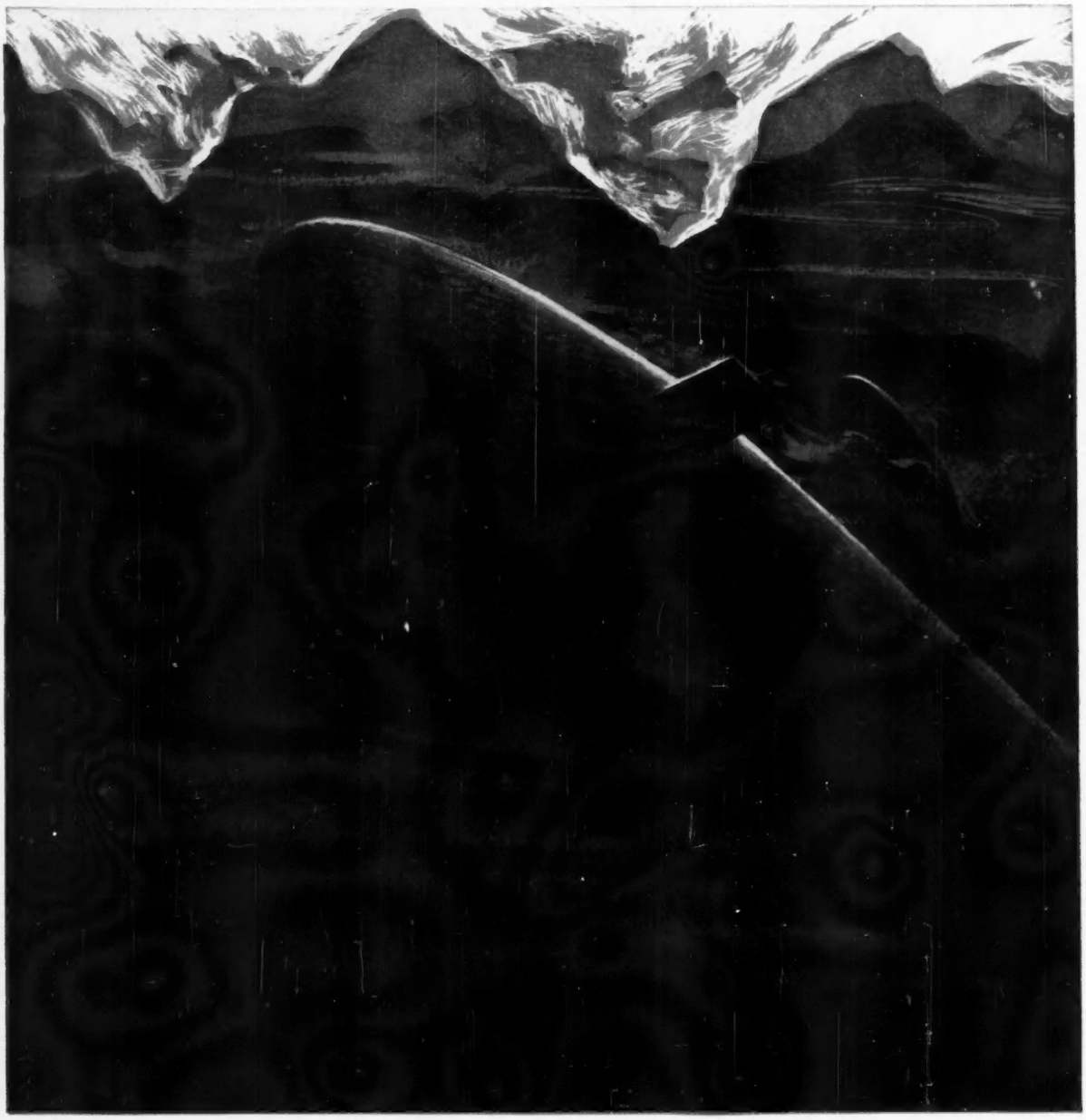
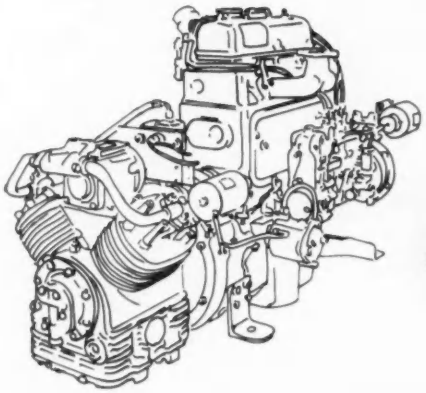
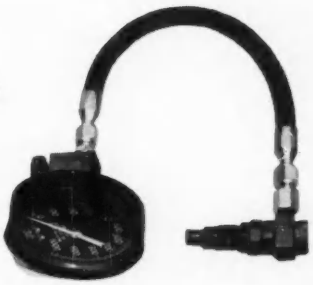


For more information write in No. 714





In-Place Checkout for M-B Diesels

Testers and test procedures for 4-cyl Mercedes-Benz diesels widely used in truck refrigeration, M-B diesel cars.

With more and more Mercedes-Benz 4-cyl engines going into truck refrigeration service need for improved checkout techniques grows proportionately. Also, the number of 180D and 190D cars in service, sold through Studebaker-Packard, is going up. In fact it was Studebaker-Packard that approached Kiene Diesel Accessories to solve a problem in taking compression and firing pressures.

The result is a tester that permits both of these pressures to be taken on a running engine without disturbing the injection nozzles. Also, application of Kiene's portable nozzle tester enables nozzles and some injection pump functions to be checked right on the engine.

Taking Compression and Firing Pressures

Both the 180D engine (industrial model OM636) and the 190D engine (industrial models not currently available) use glow plugs as starting aids. These are the Robert Bosch KE/GA ⅛, Beru 214 GK type. Cylinder pressures are taken by replacing the glow plug with a special adapter.

Compression readings are taken by cutting off fuel delivery to the cylinder being tested. This is easily done by loosening a high-pressure line nut to spill fuel. The engine is started on three cylinders and the idle adjusted to give reasonable smoothness. Pressures are taken several times to be sure that readings repeat. Pressure is recorded.

To take firing pressures the cylinder is cut back in by tightening the line nut. After the engine "settles down", firing pressure readings are taken, care being taken to expose the instrument to combustion gases for as short a period as practical. This reading is also recorded.

The adapter is moved from one cylinder to the next until a complete set of readings is obtained. Engine speed setting is not changed throughout the tests. Both compression and firing pressure readings should be within 75 psi from the lowest to the highest. A wider spread in compression readings indicates mechanical troubles —faulty rings, valves or gaskets. If compression pressures are consistant but firing pressures are erratic, chances are that the trouble is in the fuel system.

Low firing pressures may be due to a partially-restricted nozzle, a leaking injection line or a fault in the injection pump. High pressures can be caused by excessive fuel delivery from the associated injection pump barrel and plunger or a leaking and dribbling nozzle. The latter case can often be identified by unusual combustion "knock".

Testing Nozzles

Hardware is available for connecting the portable test pump to the nozzle holder assembly inlet. Pressure is built up until the nozzle "pops". A "stop" hand on the gauge indicates this pressure. Two or three tries are usually sufficient to determine when popping occurs and this sparing use avoids loading the cylinder with fuel.

Recommended popping pressures are 1565-1700 psi (110-120 kg/cm²). All nozzles should fall within these limits and for best results there should not be more than 50-psi difference from the highest to lowest. Nozzles falling outside the limits should be removed for servicing.

Nozzle leak-off rates can also be checked by holding the pressure to slightly below the popping point. Pressure drop in so many seconds (or seconds for a selected pressure drop) indicates the leak-off rate. Lacking actual figures, an idea of acceptable leakage can be obtained from tests on a nozzle known to be good.

(*continued on page 34*)

Sealed Power's new Research Laboratory has many functions, does many things including . . .

Solving an Oil Consumption Problem

SEALED POWER rounded out 1960 with two marks of distinction. First, on December 11th they celebrated their 50th Anniversary. Second, at this time they were nearing completion of their new Research Center. This is not to say that they lacked research in their first fifty years . . . their success proves otherwise . . . it is just that research functions are now centralized and services extended. The Research Center officially opened in June, 1961.

Timing is good . . . required tempo of research is accelerating. Showing appreciation of this, Don M. Helsing, Vice-President, Engineering, stated, "Research is the backbone of industrial survival today. We want to not only survive but go ahead in the next 50 years."

Here, research takes two directions. There's basic research into metals—finding new materials or better alloys for specific jobs. Surface platings and coatings are another phase of investigation. Then there is development of processes to turn these materials into products. Also, development of new products to meet specific customer needs.

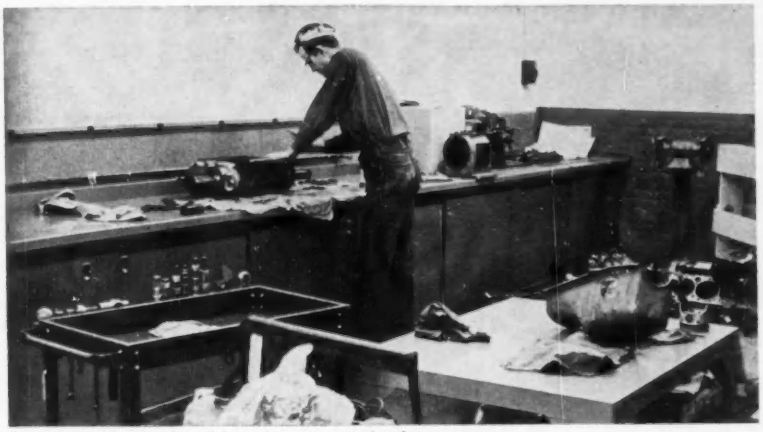
Sealed Power makes piston rings, pistons, sleeves and sleeve assemblies, and sealing rings for both the original equipment and replacement markets. This creates need for another type of research—investigation of applicational and field problems involving their products.

A typical problem—high lube oil consumption in production engines after break-in—is selected to show some of the Research Center's facilities and how they are put to use on a specific problem.

". . . while we're proud of the modern entrance to our Research Center, we're more proud of the facilities inside and the people that use them. This combination can originate better materials, products or processes . . . or supply answers to customer problems. These production engines that burned oil after break-in used our rings. Rings always seem to be the first items blamed. We had to find out if it was the rings and if not, what was the trouble . . ."

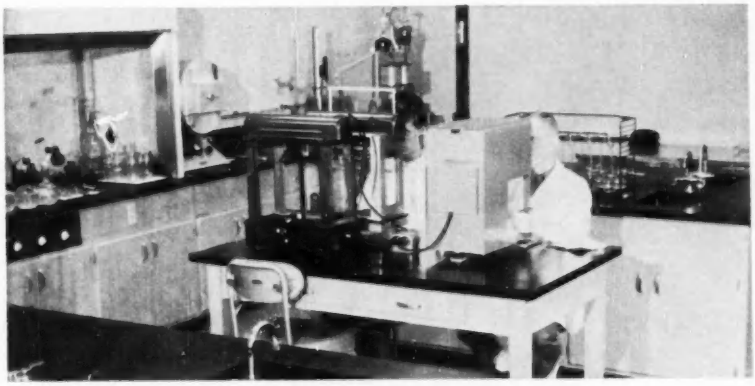
". . . in basic research or field problem, reaching a conclusion requires direction. We planned a program to find why the engines burned oil. Application engineers reviewed their recommendation as to the ring set used; plant quality control people checked that nothing had gone wrong to upset our normally high quality standards. Nothing was found; we had to dig deeper . . ."

(Right to left, Don M. Hesling, Vice President Engineering; D. A. Paull, Chief Metallurgist; and E. C. Beck in charge of Product Development Group. Commentary is by Mr. Hesling.)



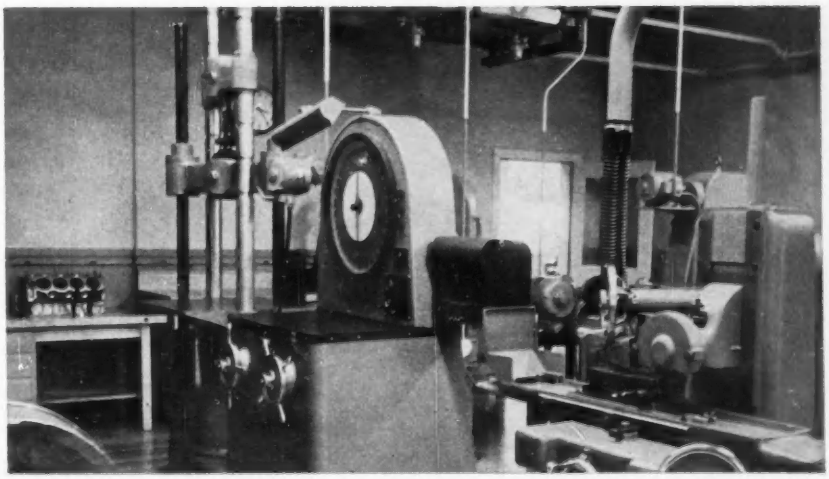
". . . tear-down and buildup of engines and other assemblies goes on continuously. Tear-down of the engine was careful with frequent inspections. We wanted to see if there were assembly errors, improper clearances or built-up dirt—frequently machining chips or coring sand. We wanted to see the rings; we can tell a lot from their appearance. Also, liner bore finish is extremely important to us as you'll see . . ."

". . . we asked for an engine right off the line to test. Our new garage area here is convenient for handling incoming and outgoing engines but more important, it gives us facilities for in-chasssis work, facilities we didn't have before . . ."

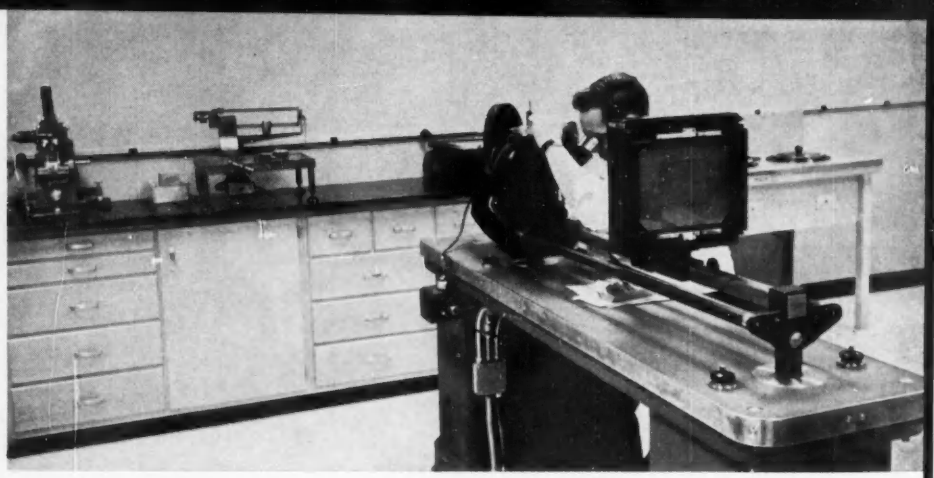


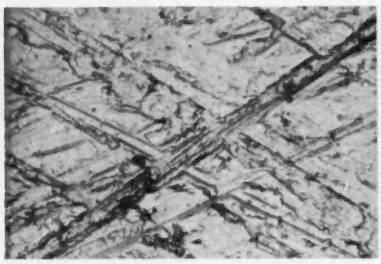
". . . this lab works with the Metallurgical Group. It's set up to all types of chemical analysis that we might need. Included is equipment for experimental plating. They would do any analysis we might have needed to track down the oil-burning condition . . . for example, analysis of contaminants in lube oil from the test engine . . ."

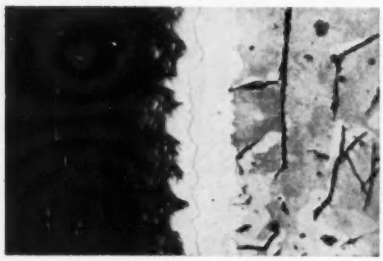
". . . if we have spare test engine liners we might cut a 'taper section' from one to show the bore surface contour. We're very interested in the honed finish of cylinder bores because of its affect on ring seating, initial wear and later oil consumption. You'll see a taper section later. All this lab equipment is used extensively by the Metallurgical Group in preparation of specimens (including heat treatment' for test and in the actual testing. It's essential for our metals research . . ."



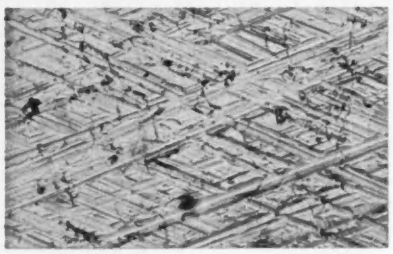
". . . the Fax Film technique is a non-destructive way of actually seeing bore surface finishes. New liners are microscopically grooved in a pattern by honing. The slight surface roughness speeds ring seating and the grooves retain oil to insure lubrication during the critical break-in process. Angle at which grooves meet, depth and shape of groove are all important. Grooves that remain after reasonable running can contribute to high oil consumption. So we're interested. Here we photograph Fax Film at 100X magnification using a bright field and polarized light. Incidently, the same technique is used to photograph taper sections . . ."



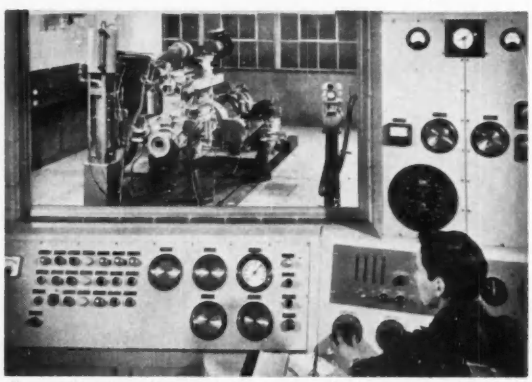




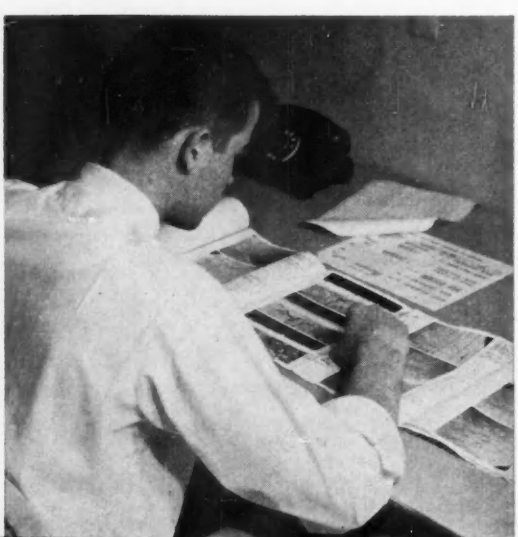
". . . taper sections show the surface's profile. The cut is taken through the liner surface at a fixed angle to the bore radius. This accentuates the plateaus and valleys but still permits accurate measurement by computation. The surface (left edge of gray area with graphitic flakes in black) is first copper, and then chromium plated to outline the contour and protect it. The specimen is then mounted, lapped to the correct angle and photographed . . ."



". . . here are Fax Films. An acetate material is pressed against the liner surface. When dry, it can be peeled off. It gives an exact 'fingerprint' of the surface. Here's how a bad honing job looks (top). Notice the irregularity, the deep gouges and the sharp angle at which hone marks meet. Here's a good liner finish (bottom). Our experience tells us that this finish will produce good ring seating while retaining enough oil to prevent scuffing. Yet after ring and liner mating, no scratches of significant depth will remain to cause lube oil consumption . . ."



". . . after tear-down and inspection, the test engine is rebuilt and a test-run made. It is put through the customer's or our own test schedule to establish a base line. It is again torn down and inspected, including Fax Filming. In this particular case we pinned the high oil consumption to improper liner finish. Liners were re-honed to our specification and the test re-run until we could prove that with proper final honing, lube oil consumption would not be excessive. We have several test cells for this work. Water brakes load the engines and full instrumentation monitors engine data. Cells are spacious and accoustically treated. Exhaust lines run through water troughs under the floor to a large central silencer . . ."



". . . on completion of any test program a full report, supported by Fax Film photos and taper section photos (if made), is prepared. Recommendations for corrective action are also given. Cases of improper bore finish could be due to wrong grit size, high stone pressures, improper honing speeds or loaded stones. In this case, the honing marks were cut too deep by a coarse grit. Subsequent honing smeared the edge metal over the grooves, closing them up and giving the appearance of a proper finish. After this swarf wore off, the grooves were opened up and excessive oil consumption resulted. Proper honing corrected the condition and gave the rings a clean bill of health. We feel that our Research Center will not only produce better products but as in this case, back them up for greater customer satisfaction both in the factory and in the field . . ."

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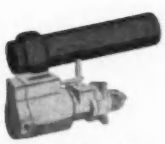

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Get the Right Brake Blocks!

Raybestos test fleet evaluates research findings in the field.

Better stopping power, lowered costs can result from proper brake lining selection—for your application! Finding the right answer is easier than you think . . . with proper help.

It's easier these days to get a big piece of equipment going than it is to get it stopped. Efficient engines and high-speed turbocharged packages get big loads in motion fast, and keep them moving. This is progress. But a similar search for efficiency is being waged by manufacturers of brakes and brake linings to stop these loads with equivalent effectiveness. The gains they make may not be as exciting, but they're just as important. The fact that brake research has even kept pace is a testimonial to the development effort expended by brake research people.

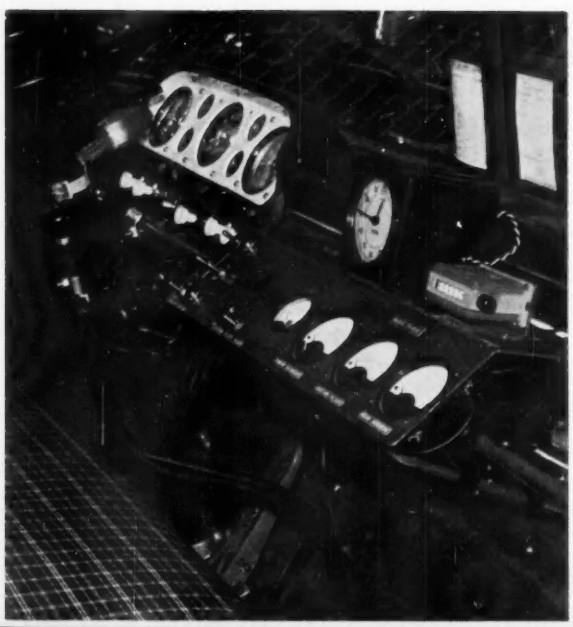
The man in the field, the fleet superintendent with responsibility for equipment, tends to accept brake replacement costs and an occasional failure as part of the overall stopping picture. This is true, but there are degrees. A careful look at the brake service operation may cut a sizeable portion of these costs.

Assuming an adequate braking system, proper stopping at reasonable maintenance cost depends on proper selection of brake replacement parts, and maintaining proper dimensional relationship and stability of the components selected. Brake blocks must fully contact the drums, and the drums must be true. Selecting the proper materials and properly servicing them is a function of normal fleet maintenance.

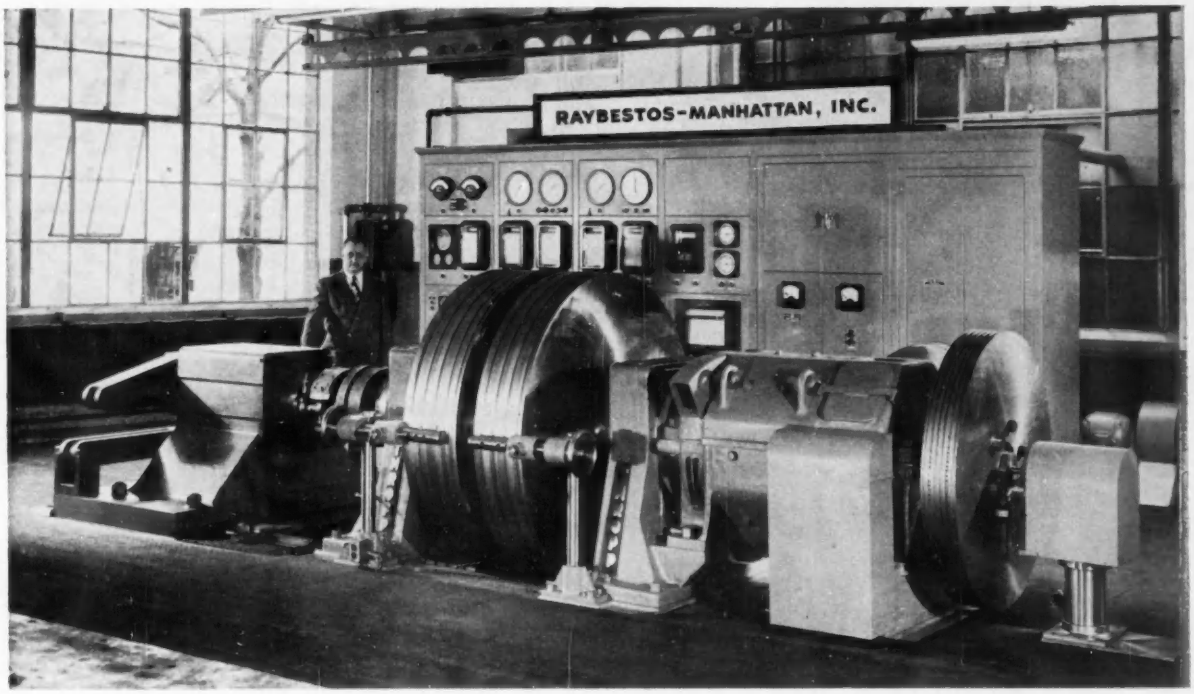
If costs seem to be too high, the equipment superintendent can explore directions of improvement. He can reexamine his servicing procedures. Possibly, he can specify a different type of drum. Or, he can explore the different lining possibilities that are readily available.

If, however, everything seems to be right yet problems of brake ineffectiveness or high costs are still present, the wise superintendent looks for help. There is no one drum-lining combination for all service. It varies with each application, and he may find he has to experiment.

Services are available to help him. Manufacturers are perfectly willing to lend assistance to a cost-plagued user. Here, for example, are some of the procedures used and data collected by Raybestos Division of Raybestos-Manhattan.



Raybestos Div's fleet of 23 test vehicles is fully instrumented, checks out relative characteristics of different lining combinations.



Dynamometer assimilates data on a fleet operation, simulates actual braking requirements. Results are verified on test fleet.

Research Findings

Raybestos' research indicates that in most instances a combination of brake blocks works most effectively. The combination consists of a lining with one coefficient of friction on the forward shoe while a lining with a different coefficient of friction is used on the reverse shoe. Reason is that both shoes on a single brake do a different amount of work, because of brake design. Thus, Raybestos assembles combinations of brake blocks engineered to perform properly on each of the many service applications.

For example, an over-the-road truck would use a set of blocks with two different frictions. An intra-city bus would require yet different frictions of brake block because of the many stops it would be making and also because it would be making these stops from relatively slow speeds. A different combination of brake blocks for this service is indicated. For certain heavy-duty applications Raybestos may recommend a combination of molded and woven brake blocks, the molded blocks normally being on the forward shoe.

Brake drum wear is another consideration. Big brake drums are very expensive. Raybestos calculates brake blocks formulas not only to stop but to treat the drums gently. One of the dangers to the user of cost-only brake lining is that of excessive drum wear. Wrong linings can cause rapid wear, heat checking or cracks in operation.

Cost Per Mile

Raybestos has long stressed the importance of cost-per-mile. This, in the final analysis, is the only meaningful cost to the user because it can frequently be the difference between profit and loss.

One phase of lowering these costs is use of consistant product, with identical qualities and characteristics regardless of purchase place or date. A type of lining must have the same operating characteristics whether purchased in New Orleans or Seattle. To guarantee this uniformity, Raybestos exercizes strict quality control that even reaches into the raw materials.

Raybestos mines its own asbestos. Then, each lot in every shipment is subjected to a series of inspections. These include (1) test to assure that the asbestos fibres are always the right length; (2) chemical analysis to cull out fibres with any impurities; (3) ash and water crystalization test at 1400°F to make sure that fibres will not break down during severe braking; and (4) soaking tests to prove ability of the fibres to absorb necessary resins.

Raybestos also makes the resins used in its compounds. The same is true of bonding cement. Raybestos produces these agents itself to assure exacting quality standards.

(*continued on following page*)

Proper Brake Blocks . . .

(continued from preceding page)

Testing

Testing at Raybestos simulates the operating conditions of many fleets with its dynamometer testing operation. When operation details are transcribed to the dynamometer, the engineer determines the combination of brake blocks with the coefficients of friction that best suit the individual user's needs. Also, it is through such testing that friction materials are constantly being improved.

Dyno results are service-tested in Raybestos friction materials test fleet. Vehicles are fully instrumented, and tests are conducted in the varying terrain of Connecticut, Pennsylvania and Arizona. Specified routes standardize comparison. Mountainous Pennsylvania terrain is excellent for durability and fade tests, while the Arizona test area is ideal for high-speed and high-temperature testing. Armed with how fleet operators use the product, the company can guide the customer to best performance and lower operating costs.

Need for Records

While lab tests are vital, the key to development of better linings and correct selection of same is the experience of the fleet itself and the records it keeps. The better the records, the easier to find the solution. These records are evaluated with reports of the equipment superintendent, driver reports and tachograph records. Additional information needed to determine optimum friction material formulation are loads carried, distances traveled, terrain, climate, air pressure, traffic conditions, frequency of stops—and driver habits. Also considered are vehicle's axles and brake design.

Conceivably, it might be said that the real test of brake requirements starts after delivery to the customer, when the unit is put into day-to-day operation. While the unit as delivered to the fleet operator certainly has completely adequate brakes and sure stopping, the *optimum* braking needs for a given application can only be determined in use. As a consequence, in certain cases the second set of brake linings will meet the fleet's needs best.

Summary

It is important to remember that differences in brake lining costs do not noticeably affect cost-per-mile. Nor do they add substantially to full initial cost. Labor is a big item, and labor costs for installing the wrong brake blocks is identical to that of installing the correct ones. Correct linings reduce per-mile costs because fewer relines are necessary, labor costs of too-frequent adjustments go down, downtime and pull-in costs are reduced and product uniformity reduces check-up costs.

In brake blocks it's the last cost that counts. And reducing brake block cost-per-mile is largely a function of finding the right combination.

M-B Checkout . . .

(continued from page 27)

Incidently, it's a good idea to repeat these tests after nozzles removed for bench work are reinstalled. Deposits in nozzle bore holes, cocked nozzles, improper seating or over-tightening can cause even a good nozzle to fail.

Field Pump Tests

By connecting the test pump so as to pump back through the pump outlets or the lines, one at a time, delivery valve leakage can be detected. All four valves must be in good shape. Leaks will cause all sorts of injection irregularities. Any faulty delivery valve should be replaced.

Accuracy of injection pump timing to the engine can also be checked. To do this, port closing on No. 1 cylinder's pumping element must be checked against flywheel markings. There are two methods, depending on whether or not the delivery valve has been removed. First, without delivery valve removal.

The engine is turned to about 30 deg before TDC on the compression stroke for No. 1 cylinder. About 500-psi backpressure is applied on No. 1 delivery valve and maintained. The engine is then turned in the direction of rotation. As soon as the pumping element's ports close (start of injection) a reaction is noted on the tester gauge. Degrees before TDC can then be checked on the flywheel.

If the delivery valve has been removed, the tester will pump fuel back through No. 1 pumping element with little resistance as long as the port is open. Setting the flywheel as before and turning the engine slowly, definite increase in pumping resistance will be felt at port closure. Again, flywheel position can be checked to verify timing.

One other practical test determines relative plunger leakage. For this test, all delivery valves must be removed. As before, the tester is connected to pump back through each outlet connection in turn. The engine is turned until 2000-psi pressure can be applied to the connected pumping element. Leak-off rate is noted. This is repeated with each pumping element in turn.

Leak-off rates will be quite similar for all four pumping elements of a good pump. Representative values can be obtained from a new pump or developed through experience.

Conclusion

It's significant in all of these tests that conditions within the cylinders as well as checkout of the injection system can be performed without major dismantling. Also, it is preferable to remove the glow plugs rather than the injectors. It may be necessary to remove delivery valves but otherwise only the high-pressure lines are involved.

Before any other items are removed or adjustments disturbed, it's possible to locate the source of trouble accurately. Savings in downtime as well as the actual cost of parts removal, testing and replacement will pay for practical, modern test equipment over and over again.

More valves are ground on SIOUX equipment than all other kinds combined

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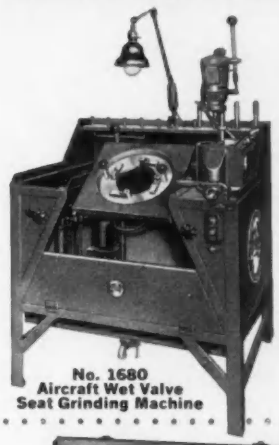

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Aircraft Wet Valve
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For more information write in No. 716

TORQUE TIPS FOR LONG LIFE

by Tom Green
Field Service Engineer
P. A. Sturtevant Co.

Taking guesswork out of torqueing pays off. The simple nut and bolt establishes proper stress and dimensional relationship between component parts that form a working unit.

If you don't tighten that nut or bolt enough it will vibrate off. If you go too far in the other direction, the stud will snap. At best, the threads will be damaged. Even if you guess at what seems to be correct tension, there's no assurance that your guess is a good one. Does it matter? Yes, it does.

Metal is an elastic medium, and the hidden damage from improper tightening of an assembly is the result of either not stretching it enough, or stretching it too far. The nut and bolt is not just a medium to hold parts together, but is a means by which proper stress and dimensional relationship is established between component parts that form the working unit. If this relationship is disturbed, the damage extends into adjoining assemblies and shortens equipment life.

For instance, precision manufacture of a cylinder liner will be wasted if, when tightening the cylinder head improper torqueing of head fasteners distorts it. Every manufacturer recognizes this danger and gives a specific set of values for each piece of equipment.

Let's take a look at one of the largest manufacturers of heavy construction equipment—International Harvester. This equipment is designed to deliver thousands of hours of service at minimum maintenance. The engineers who designed it for this type of service gave long and thoughtful considerations to every detail. One of these was proper and specific torqueing for every nut and bolt *in the whole machine*, be it dozer, scraper or what-have-you. Failure of any one part means downtime. Every bolt and stud has a calculated pretension valuve, based on material, diameter, length and temperature end-range. Along with selecting the proper fastener, these engineers selected the proper torque value for its application. Following these recommendations pays off in service.

For example, I-H wet liners are honed to final specifications in a fixture that simulates the stressing they will be under when installed in the engine and the head torqued down. When removed from the fixture there may be some slight distortion, but when installed in an engine that is properly assembled, roundness and straightness is assured.

I-H engineers take every precaution to prevent even accidental torque error. One block design, for example, required that two different stud lengths be used to hold the cylinder head, one 5-in. longer than the other. Obviously, elongation would be different with the two stud lengths and to get the same pre-tensioning, two torque valves would be necessary. Since different torque specs on the same head present an occasion for mechanic error, I-H chose a safer way. Part of the diameter of the shorter studs were turned down, equalizing the elongation. Result—one torque spec for all head studs.

Service people can easily understand the importance of proper torqueing on certain things. Overtightening of injectors during installation, for example, can cause enough distortion to cause sluggish action or sticking of needles. Some equally important ramifications are

(*continued on page 38*)

Field Test Kit Troubleshoots Turbos

On-the-spot checkout tells whether or not a turbocharger is ailing . . . and if so, where to look for trouble.

It's great to be able to pinpoint the actual cause of trouble right in the engine. It takes the guesswork out of troubleshooting and saves a lot of needless "parts changing", something that's all too common. That's why a lot of test equipment and analyzers have been devised . . . and smart men use them. Now, the idea of "nondestructive" testing has been extended to turbochargers.

Turbochargers are basically a simple machine yet to some they have an air of mystery. Perhaps the reason is that they have lacked "touchstones" telling what's going on in an operating turbo. They see inside the turbo only when it's cold . . . opened up for inspection. Now they can check out its performance in operation and verify its condition. This is done with the Turbocharger Field Test Kit built by Alnor Instrument Company along lines suggested by the Schwitzer Corporation.

What do we want to know about a turbocharger? In general, we want to know that it is delivering air at the right quantity and pressure in relationship to the level of exhaust energy fed to the turbine by the engine. If it does this, it's in good shape. If not, it's usually an indication of some trouble and the idea then is to try and pinpoint it.

This is the objective; let's see how it's done. One component of the test kit measures pre-turbine exhaust gas temperature. This temperature is a practical index of the amount of energy being supplied to the turbine.

Another instrument measures the engine's intake manifold pressure. This tells the amount of work produced by the compressor-end of the rotor. Under reasonably standard conditions, with everything in good shape, there should be good correlation between work output (manifold pressure) and energy input (exhaust gas temperature).

What should these values be? This will depend on the make and model of turbocharged engine. Data for a particular engine-turbo combination must be obtained from the engine and/or turbocharger builder . . . or worked out from engines known to be in excellent condition.

Among other things to be checked on a turbo are shaft speed and the factors that influence it. Excessive speeds can cause severe damage. The kit contains a tachometer with a maximum range of 120,000 rpm! One cause of high rotor speed is extreme turbine inlet temperature. This can be due to severe engine overloading. Or altitude effects will cause overspeeding.

Altitude affects turbocharger operation and so an altimeter is included in the tester. A table permits conversion to barometric pressure. A turbocharged engine, compared to a naturally-aspirated engine, will retain sea-level rating to a higher altitude. Beyond this point it will always produce a higher percentage of its full power.

However, as altitude increases and the engine tries to maintain full power, its exhaust temperature rises. This, alone, tends to speed up the turbo. The compressor is now working with thinner air and offers less resistance to turning. The only solution is to accept reduced power, backing off on fuel to the engine to control maximum exhaust temperatures.

This suggests another use for the tester—setting operational limits when it is known that altitude operation will be encountered. *

Two variables affecting compressor operation (thus intake manifold pressure) are also measured by the tester. One is the inlet air temperature. In most cases this will be within a few degrees of ambient temperature. However, if the air is picking up heat from some external source, the compressor is working with expanded air and manifold pressure can suffer.

Compressor inlet vacuum is also measured. Normally, the air cleaner is the only restriction in the air induction system and if inlet vacuum exceeds the maximum for full-speed turbocharger operation, it is an indication of excessive restriction at the air cleaner.

On the turbine side, a check is made of exhaust manifold back-pressure. A turbocharger by its nature will create some back-pressure but within limits acceptable to the engine. Any abnormal restriction to gas flow in the turbine such as deposits or other extraneous matter blocking nozzle ring openings will increase back-pressure on the engine.

In this regard, the exhaust piping leaving the turbine is a frequent offender. Too small a size, too many bends or bends of two sharp radius, and excessive tailpipe lengths are common mistakes. A slight increase in back-pressure at the turbine exhaust is greatly magnified at the turbine inlet side with the result that the back-pressure at the engine becomes excessive. Cylinder temperatures, particularly in the exhaust valve area, go up and can result in severe engine damage.

Finally, one very important measurement is turbocharger oil pressure. Not only can running pressures be indicated but also time required for pressure buildup from a cold start. It is extremely important for turbo life that they get oil and at least at minimum required pressure very rapidly.

* Another useful Alnor instrument, an exhaust pyrometer installed to monitor turbocharger inlet pressures, is currently used by truckers. Both Mack and Schwitzer have recommended its use. Drivers have a dash-mounted indicator and in altitude can reduce engine load by dropping into lower gear and reducing fuel to keep exhaust temperatures within safe limits—Ed.

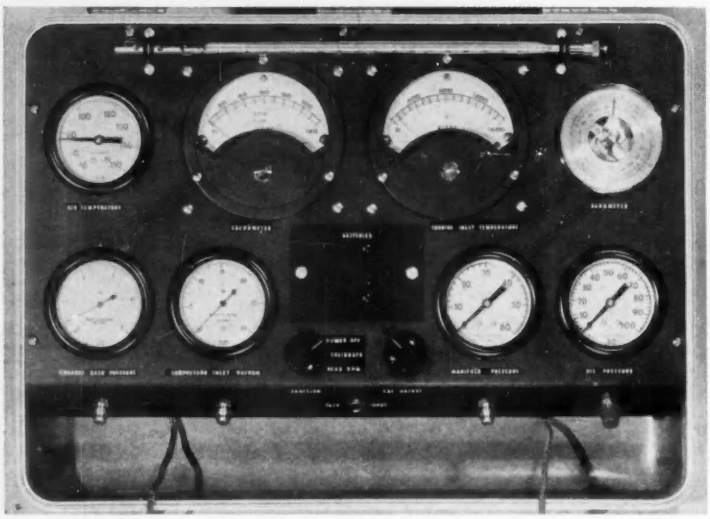
Turbo Test Kit . . .

(continued from preceding page)

Summary

This field turbocharger test kit was designed and built by Alnor. They combined their many years of experience in the diesel field with Schwitzer's turbocharger knowhow. The kit is packaged as a unit with all necessary components. Completely portable, it weighs about 23 lb. Now it's possible to check out turbochargers including the air induction system and any effect of the turbo on back pressure.

This should be a valuable maintenance tool in two ways. First, it eliminates guesswork in troubleshooting. Second, it can be used in the course of routine inspections to verify turbo condition. From this, optimum periods for servicing and overhaul can be set up with assurance.



Test kit for turbo checkout is a complete unit with all instruments and connections needed for tests outlined in text. Tester is useful for trouble diagnosis, for scheduled inspections and under certain operating conditions to establish turbocharger operating limits.

Torque Tips . . .

(continued from page 36)

less evident. Mechanics can think of a hundred reasons why one engine runs for 160,000 hours while an identical engine delivers only 80,000. Engine designers point to proper servicing, and take great pains to spell out exactly what they want.

Take I-H's H17 engine. According to factory recommendations cylinder head is retorqued during predelivery servicing, again after the first 100-hours, and at periodic intervals thereafter. This is important enough for the designers to provide complete accessability including hand-removal of the valve covers. And they have good reasons.

I-H's research showed that cylinder head bolt tension decreases with engine usage. The bolts loosen as mating surfaces of bolt and block threads "work in." There may be some "heat setting." Also, some "give" takes place in the head gasket. Obviously, greatest reduction in bolt tension occurs when engine is newest. Thus, pre-delivery and 100-hour re-torqueing. Those extra hours of trouble-free operation are solely dependent upon good periodic service based on manufacturer's recommendations.

The "Convincer"

International Harvester Service School uses an instructional aid that makes a lasting impression on its students. For good reason, it's called the "convincer." Once exposed to it the student always remembers that torque specs must be followed.

An engine block is laid upside down, to make the bearing caps accessible. A straight mandrel fits the main bearing bores with slight clearance. A crank is provided for turning it. It is placed in the saddles and the caps installed. Each student takes a turn at tightening the caps by "feel," with a socket wrench. If he succeeds the shaft will spin freely: few succeed.

The instructor then pulls a slip of paper from his pocket. Numbers, very much like the combination to a safe, are used in conjunction with a torque wrench. When caps are properly tightened, shaft spins freely.

Originally, each bearing cap had been torqued to a different pre-tension and bearing mounts line-bored for the shaft. Then, when the instructor re-tightened each cap to its individual *design* specifications misalignment due to improper cap bolt torqueing disappeared.

This teaches the student two lessons. Before any metal cutting is done on a part, all attached assemblies must be pre-tensioned. Then, to restore proper alignment and dimensional relationship after disassembly, all that is needed is to restore the same tensioning. Second, students learn that even a diesel engine block —which is a big piece of metal—changes its actual dimensions under stresses exerted by a handful of nuts and bolts.

Improper pre-tensioning resulting in misalignment means wear, which is another way of saying short engine life. This is the lesson I-H really wants to get across.

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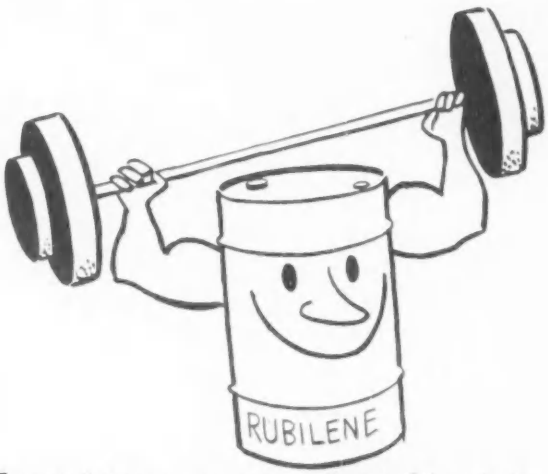

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New Shape in Nozzle Seats

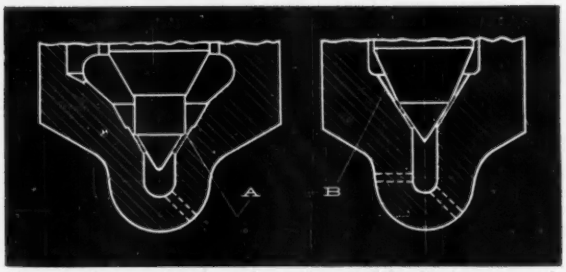
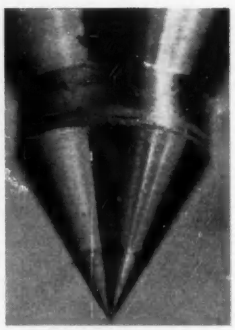
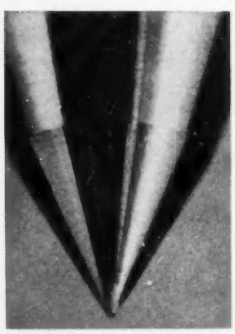


Diagram of conventional nozzle seating at left. Erosion commonly occurs at "A". New double-cone seat diagrammed at right, helps prevent erosion. Narrow escape path for oil at "B" is effective in cushioning seating impact.

Robert Bosch Corporation details their new concept in nozzle seat design.



Conventional needle and cutaway seat shows erosion clearly. Reconditioning is imminent, involving probable face grinding and seat lapping operation.



Double-cone needle and seat is quite free of erosion. Both this nozzle and one above were operated for the same period under identical service conditions.

Some new-production nozzles built by Robert Bosch incorporate a refinement they call a "double-cone" seat. It is typical of so many seemingly-minor modifications that add up to significant performance improvement and life increases. This report, based on an interview with R-B technical personnel, will tell what was done, why and will alert those involved with nozzles of this modification.

The double-cone seat is being used in direct-injection, hole-type nozzles. Most nozzles of this type have been built with the type of seat illustrated. After long use, the upper edge of the needle face at (A) is damaged by cavitation errosion. This necessitates needle face grinding. This in conjunction with seat lapping during nozzle reconditioning, allows the needle to drop in further, increasing its lift. Once lift exceeds limits, the nozzle is through.

One purpose of the double-cone design was to minimize this cavitation errosion and thus extend effective seating for a longer period. Other advantages were soon found. Due to the reduced escape area for the fuel past the upper cone (B), a cushioning action occurred. Needle impact on the seat was considerably reduced.

This, while important in itself, permitted use of a higher needle valve to seat diameter ratio. In the former design the highest ratio feasible because of seating impact was 2:1. Now, because of the cushioning action, the ratio can be up to 3:1. This is reported to permit smaller and more positively sealing seats.

Another advantage of this patented design is the reduction of "dead volume." Fuel injection builders have found that the least amount of fuel in the injection system above the plunger, in the delivery valve, the line and nozzle, the better the control of injection characteristics.

According to Robert Bosch personnel, these characteristics of the double-cone seat have resulted in both improved nozzle performance and longer service life. In one reported case, service life was extended up to three times!

Filters as a Warning Device

"Full-flow lube oil filters, besides being thought of as a means of maintaining oil in clean operating condition, should also be considered as a warning device." This statement was in a letter from Lee Townsend, Wm. W. Nugent & Co. He went on to explain that sudden development of high differential pressures across filters was a sign of trouble. Their filters are equipped with a pressure gauge and a 3-way cock so that inlet and outlet pressures can be measured to show the pressure drop across the filter. Ordinarily, this data is intended to show when a filter element is reaching its full contaminant capacity and is in need of replacement. Under normal conditions, the pressure drop builds up gradually. Quick buildup is a sure sign of trouble.

Investigation of many reported cases of short filter element life as indicated by differential pressure buildup has frequently shown presence of water to be the reason. Once operators were convinced and the water leak into the oil located, filter element life returned to normal. In other cases the contaminant was quite distinctive, aluminum wear metal for example, and indicated trouble.

If operators would watch pressure drop across the filters and be alert to changes in rate of pressure buildup, their filters would act as a warning device for catching engine troubles early.

Don't Forget the Oil Cooler

There will be less oil oxidation and resulting deposits if oil temperatures are kept within recommended limits. As a check on oil cooler condition, oil temperatures can be taken through the dipstick hole with a thermometer. This should be done with the engine stopped, right after it's been working hard. Excessive temperature, everything else being normal, is good indication of an oil cooler in need of servicing.

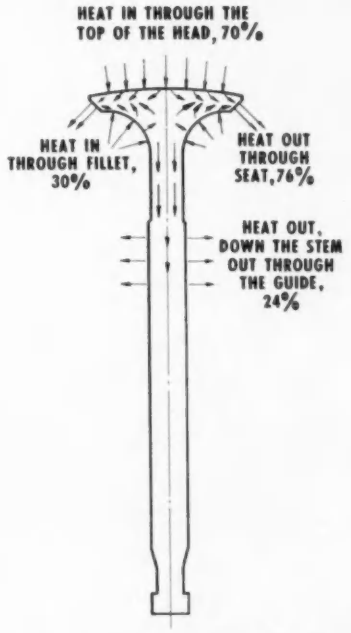
When you take a cooler off for cleaning, do yourself a favor and clean it right then. Don't give the gums and sludges a chance to harden. Solvents such as trichlorethylene used in a circulating system are effective on the oil-side. The water-side should also be cleaned, using good cooling system techniques.

While the cooler is off the engine, check for leaks. Suitable cover plates and gaskets will usually be necessary. Application of compressed air with the cooler in water will show by bubbling where there are any leaks.

Valve Seating MUST be Good!

Engine valve seating has two important jobs to do. The first its obvious and well known—to seal the cylinder and retain combustion pressures. But there's another function of valve seating that will largely determine how long good sealing will last. This function is to cool the valve, provide a path for heat in the valve head to dissipate.

It's pretty hard to visualize how the intermittant contact of valve and seat does this cooling . . . but it does. Eaton Manufacturing Company published in their "Eaton Engineering Forum" the results of an "analog study of heat flow." One diagram (shown) is of particular


HEAT IN THROUGH THE TOP OF THE HEAD, 70%
HEAT IN THROUGH FILLET, 30%
HEAT OUT THROUGH SEAT, 76%
HEAT OUT, DOWN THE STEM OUT THROUGH THE GUIDE, 24%

interest in demonstrating the importance of good valve seating.

With 70% heat input to the valve head, heat must exit through the seat (shortest flow path) or in the case of a bad seat take the long way to the stem. Then the valve will run hotter with higher thermal stressing and reduced fatigue strength. This will shorten valve life.

When seating valves, get a good seal. But also make sure that the seat is the recommended width and properly located on the valve face.

This is where narrowing stones come in. Also, don't reface valves excessively. Thin edges will tend to overheat, the valve drops in too far and if the seating area is out too far, strength may be too low and the valve "tulips." Follow the rules; service life will be better.

Watch Polarity with Alternators

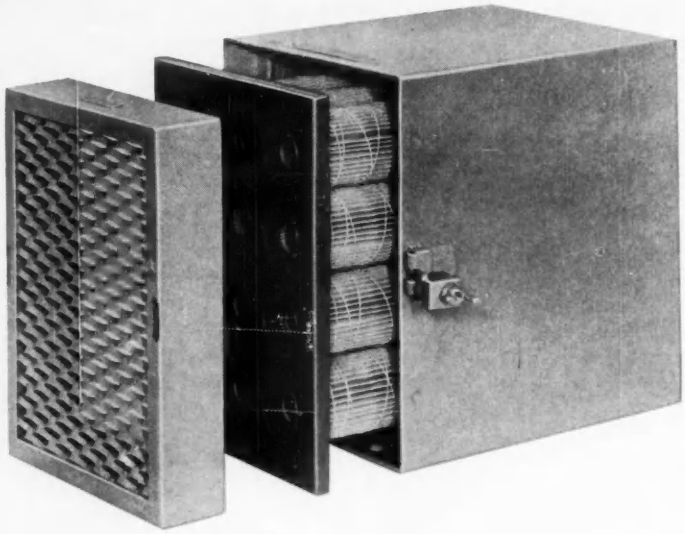
With self-rectifying battery-charging alternators becoming more popular there are a few key things to watch. One is polarity. Service bulletins from builders of this equipment and OEM users all make a point of this, so pay attention.

A good example is found in "Service Topics," issued by Detroit Diesel Engine Div., GM. They point out that all their units are the negative ground type (positive ground units are also built). Then they stress need for extreme caution when installing a new battery, attaching a fast charger or connecting booster batteries. Why? You can do severe damage to the rectifier diodes and even some of the wiring by reversed polarity.

In installing a new battery, make sure that its negative post is grounded. Similarly, make sure that the negative of fast chargers is hooked to ground. And don't use the fast charger as a booster for charging. Attach a booster battery of the right voltage and conect it in parallel, that is, the negative goes to the other battery's negative and positive to positive.

This is important—and important that it's done right the first time. It only takes an instant of reverse polarity to damage the diodes, and wiring may be damaged, too.

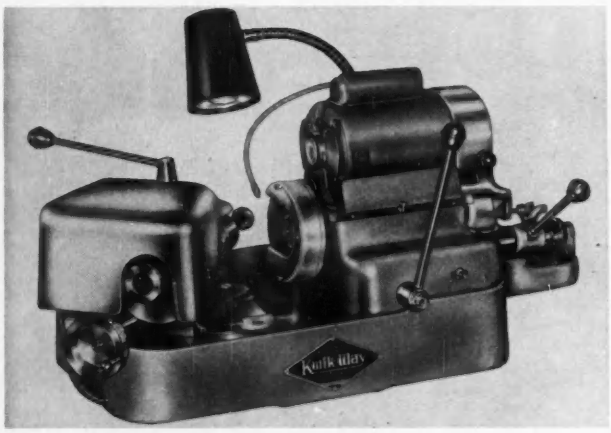
NEW PRODUCTS



"Long-Life" Air Cleaner

A single-stage dry-type engine air cleaner called Pamic Air Cleaner is available in 12 standard sizes from Farr Company for truck, tractor and stationary engines ranging from 10- to over 1000-hp. Pamic assembly consists of rectangular housing and modular type cartridge. Farr claims increased effective filtration area that provides greater cartridge service life, offers a Service Indicator that signals when a cartridge change is required.

735



Valve Facer, Corrector

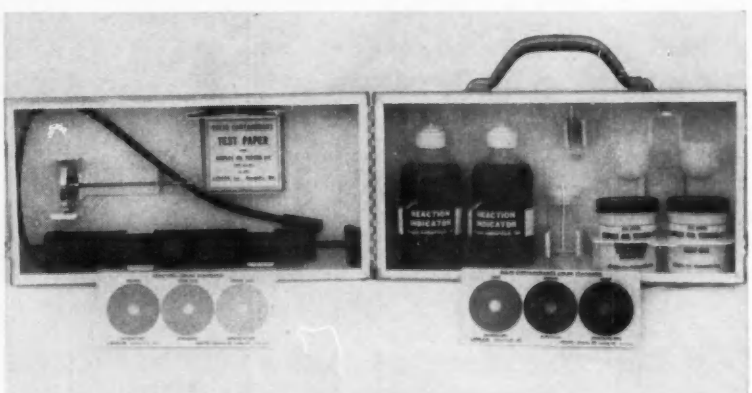
Quik-Way model VS is designed for more efficient valve facing. According to Cedar Rapids Engineering, model VS ". . . is more than an improved model, it is actually a new concept in valve facing, designed to correct valves, not just grind them". Provision is made to prevent misalignment during grinding, and there are individual motors for grinding, chuck and coolant pump. Incidentally, Cedar Rapids is offering an illustrated brochure on model VS.

736

Improved Simplex Oil Test Kit

Availability of a new and vastly improved Simplex portable oil testing kit has been announced by Lengor, Inc. Purpose of the improvement was to speed up the oil testing process, make the job easier and cleaner, and increase accuracy. Now, according to Lengor, anyone can make the test and read the results in less than five minutes. Kit is designed to test oil from all types engines where low-cost, accurate, fast results are required.

737



Larger Generators From GM's Delco

Delco Products has announced manufacture of larger capacity generators, in the 400- to 600-kw range. Said Mearick Funkhouser, "This increase in the range of our generating equipment is part of a trend in which Delco generators have steadily attained larger rating over the years, in keeping with the nation's growing needs for electric power. By expanding its generator line to 600-kw, utilizing a larger range of diesel engines, Delco Products can extend the usefulness of its generators to broader applications." Formerly, 350-kw was the division's largest.

738

Two-Speed Hydraulic Hand Pump

Owatonna Tool Co. has announced a fast-acting two-speed hydraulic hand pump that handles high-pressure requirements up to 10,000-psi, and also delivers high-volume at low pressure (7.35-cu in per stroke at from 0- to 200-psi). Called the "Dualmaster" series Y-29, it changes automatically to the high-pressure stage under load. Weight: 34-lbs. Reservoir capacity is 2-gal.

739

Light-weight Impact Wrench

Chicago Pneumatic announces their new CP-616 2-in capacity air-operated impact wrench. A rough-duty tool designed for constant usage under severe conditions, it is suitable for use in refineries, utilities, rebuild shops, etc. Has roll-type side throttle, dead handle, clutch. Lightweight aluminum housing is available to make the unit even lighter, by 10-lbs. Equipped with double-grip spade handle, suspension bail.

740

New Cat Cab

Two new cabs have been developed by Crenlo for the Caterpillar 631 two-wheel tractor. These cabs, though they add to driver comfort, do not interfere with the swing-away dash, and still permit access to the left side of the engine. Insulated against heat, cold, dust and noise, these cabs are easily installed and removed.

747

Portable 110

A handy item to include on a light service truck that does not carry a packaged 110-v alternator is a converter. The Terado Company, manufacturers of specialized electronic and mechanical equipment, have introduced a new transistorized Continental model. If above mentioned light utility truck operator should have to drill a hole, solder a wire, or use a piece of electrical test equipment to get a piece of field equipment back in service, he can take the power right out of the service battery. Converter units are available in a range of capacities, to meet the requirements of many different applications.

741

Portable Magnetic Metal Testing Device

A portable magnetic device for detecting cracks and flaws in ferrous metals is being marketed nationally by the Westinghouse X-Ray Dept. The 14-lb crack detector, portable enough for use in the field, is essentially a powerful U-shaped two-pole electromagnet which can be energized from a 6- or 12-v battery, or from a 110-v service outlet through a built-in rectifier. Operator can

quickly detect hairline cracks or flaws as deep as ½-in below the surface of the metal.

742

Mack's 6-Wheelers . . .

Known as the B-61SE and B-61 3SE, these Mack heavy-duty trucks were developed to provide that extra stamina and low maintenance needed under particularly severe operating conditions.

The B-613SE is powered by Mack's turbocharged ENDT 673 diesel engine, while the B-61SE offers a naturally-aspirated version.

743

Plastic Caps Protect Parts

Protective Closures Company announces that it can supply moulded plastic protective caps and sleeves in large sizes at low cost for small-quantity orders. Called Caplugs, these items protect threaded ends, machined ends, and vulnerable surfaces against impact damage and weathering during shipping or during transit—a useful item to have on hand in varying sizes in a parts department, for example. Sometimes, storage causes more damage than usage, to machined parts.

744

Weather Cap

Tractors, trucks, pumps, pavers, compressors, mixers, generators, stationary engines—any application that exposes an exhaust pipe to the weather is a prospect for Anthes Division, Gleason Corp.'s Weathercap. Installation prevents rain, snow, bugs and dust from getting into the engine through the exhaust pipe when the engine's not in operation. It consists of a counterbalanced cap that is placed atop the stack, closed unless opened by exhaust pressure. Models are available for pipes from 1- to 6-in OD.

745

Glass Filter Pad

American Air Filter has made available for diesel-electric locomotive engine intake, car body and main generator application, a glass fibre air filter. Filtering media has progressively increasing density, permitting dirt to be trapped in every part of the pad. Claimed advantages are that replacement costs are lower than cleaning costs, and material has high effective filtering efficiency.

746

Solve troublesome small engine problems --

USE YANMAR marine auxiliary DIESEL ENGINES

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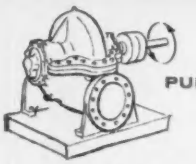
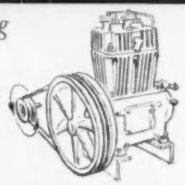


PUMPS

COMPRESSORS



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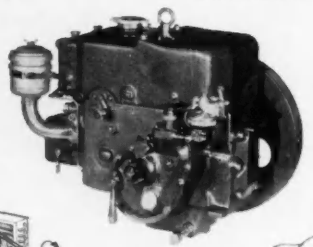

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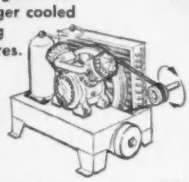

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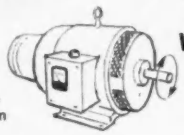

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For more information write in No. 732

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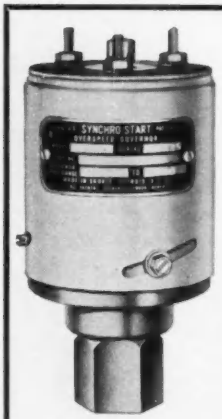
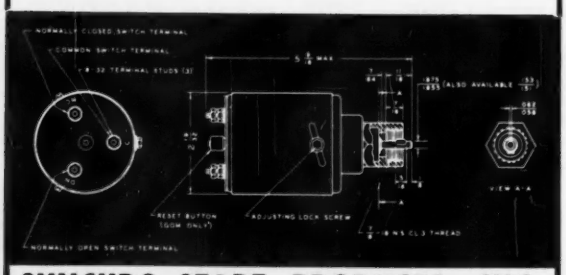


MODEL GO

That can be furnished to trip at any given speed between 300 and 6000 R.P.M.

These switches have single pole, double throw, snap-acting contacts rated for 10 Amps at 115 V.A.C. A variety of dust covers and electrical connectors are available if exposed terminals are undesired.



SYNCHRO-START PRODUCTS, INC.

8151 N. RIDGEWAY AVENUE • SKOKIE, ILL.

For more information write in No. 718

New Products . . .

Low-Tension Ignition System

Magneto and Engine Accessories Div. of Fairbanks, Morse has developed a low-tension heavy duty ignition system for gas engines. Only current inside the magneto is low voltage, with transformers of either standard or shielded type. Unit is designed for continuous-duty in oil field, irrigation, etc, use.

748

Allison's "Fork-lift Special"

A new unit, designed to handle 300 net ft lbs of engine torque at engine speeds up to 2600 rpm is the third new Torqmatic Transmission to be announced within the last three months by Allison Transmission.

It is the heavy-duty CRT-3321 for fork-lift trucks in the 10,000 to 15,000-lb class.

The new unit joins the recently announced CLBT-5940 and the CRT-3531. It's a "straight through" version without the drop box, a full forward-reversing unit with two speeds in each range. Torque ratios are 2.9:1 in low and 1:1 in high. Three torque converter selections are available giving stall ratios of 3.5:1, 3.7:1 or 2.5:1.

A special "inching" valve, permitting normal clutch operation with high engine speeds when loading or unloading the forks is an optional feature. Hydraulic clutches control the transmission, incorporating full torque shifting in all ranges.

749

A-C's 3-Plow Tractor . . .

This new 3-plow tractor, the D-15, weighing 4500 lb and in the 40 hp range, has been introduced by Allis-Chalmers. There is a choice of three engines for the new D-15—the 149-cu in. 4-cyl "Power-Crater" gasoline or LP gas engine, and a completely new A-C 4-cyl 175-cu in. diesel engine with a 5-bearing crankshaft. All three power plants have rated speeds at 2000 rpm. Compression ratio for the LPG is 8.9:1, for the diesel it's 15.5:1. Four forward speeds, ranging from 2.7 to 16.9 mph . . . and 4.7 in reverse.

750

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If you're a distributor and you're doing something of interest to the industry (or something you're particularly proud of) don't keep it a secret. You tell us, and we'll do our best to pass the word along to other interested readers.

Western Engine Moves

GM Detroit Diesel sales, parts and service are still being offered by **Western Engine Co.**, but from their spanking-new facilities, located in Broadview, Illinois. Three double-truck bays for fast servicing, complete dynamometer test room, modern facilities for injector rebuild.

Lister-Blackstone Appointments

P. G. Clarke, Sales manager for **Lister-Blackstone,** announces appointment of three distributors. These are **Acme Power Supply Co.,** Inc., Kansas City, Kansas (covering eastern Kansas); **Brinker Supply Co.,** Pittsburgh, Pa. (covering southwestern Pennsylvania); and **Engine Power Specialists,** Phoenix, Arizona (covering central and northern Arizona).

Deutz Names Two

Diesel Energy Corp. announces appointment of two new distributors for the **Deutz** diesel engine, both of whom have complete service facilities and parts stock. These are **Air Engineering Corp.,** Battle Creek, Mich., and **Equipment Service Co.,** Inc. of Birmingham, Alabama.

GM Appoints Emerson

GM Detroit Diesel has appointed **Emerson GM Diesel,** Inc., of Seattle, distributor for the division's line of truck, industrial and marine diesel engines in western Washington and a section of southern Alaska.

A-C Dealer

Brinker Supply Co. Inc., of Pittsburgh, has been appointed Allis-Chalmers engine dealer for 26 counties in Pa. and 4 in W. Va.

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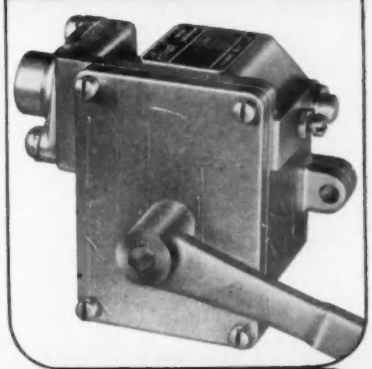

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NEW LITERATURE

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Swift replacement of components at only the cost of repair is the main advantage to equipment owners of the parts assembly exchange program offered by Caterpillar dealers. Complete explanation of the program is offered in a booklet "Avoid Delay the Modern Way". Exchange units are guaranteed in writing, backed by $5000 bond. It warrants a look.

751

Nordberg Machinery

"Nordberg Machinery for the World's Major Industries" is the title of a brochure that describes the wide variety of Nordberg products in a single, handy 24-page reference book, prepared in 3-color. Covers entire range of engines, pumps, crushers, hoists, etc.

752

More Profit

Eimco Corp. has published a 12-page booklet titled "You Get More Profitable Production With Eimco". Included are some comparisons of Eimco's line of diesel-powered crawler-tractors and loaders with competitive products. Describes Eimco's features.

753

Two-Cycle Gas

Clark Bros. bulletin 205 discusses 2-cycle gas engines with emphasis on performance characteristics in variable-speed variable-load applications. Covers turbocharging, timing control, with low-speed and overload graphed. Bulletin explains importance of good variable-speed variable-load performance.

754

Pump Info

Gould Pumps bulletin gives complete information on their high-pressure multi-stage centrifugal pumps, with capacities up to 2600-gpm for heads up to 3400-ft, working pressures up to 1200-psi. Complete specs, dimensions, cons'ruction and performance curves are given.

755

Pulling Problems

An illustrated booklet published by Owatonna Tool Co. describes their pulling system and how it can solve everyday problems. Vest-pocket size, it presents pulling principles, the three basic pulling problems, OTC's four basic pulling tools, and the application of hydraulic power to pulling problems. Also includes "Rules of Thumb" for solving basic pulling problems.

756

Oil Level Regulator and Safety Control

Garzo, Inc. has published information on their line of oil level regulators, with or without automatic shutdown; their pressure-drop warning system; force-feed lube system, etc. Gives full info and complete specs.

757

ASTM Standards

American Society for Testing Materials has published a second volume to the compilation of ASTM standards on *Petroleum Products and Lubricants D-2*, with s'andards relating to the petroleum field. There are 173 in all. Copies may be secured for $7.50 each.

758

STEEL **USE BELL** STAINLESS
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Portable Vibration Meter

A four-page brochure fully describes this battery-operated hand-carried vibration meter with high-gain transistorized circuitry, produced by Philips of the Netherlands for The Korfund Co.'s Instruments Div. Brochure describes reading, how to plug into oscilloscope or high-speed recorder, etc. Korfund is sole distributor; booklet is free.

759

Heat Exchange

A two-page two-color illustrated technical bulletin describes the C-500 heat exchanger made by American Standard, with removeable bundles and floating clamp ring design. Discusses applications and engineering specs, also use of standard pre-engineered components assembled into custom-built assemblies.

760

Engine Controls

Synchro-Start, makers of full automatic engine controls, overspeed governors and speed sensitive switches, have produced a bulletin describing their line of controls, up to and including their multiple-element switches. These operate at different speeds, where it is necessary to open and close a multiplicity of switches at different speeds. Brochure is free.

761

Compressor Valving

"Questions and Answers About Valving" is a very cleverly put together booklet released by Ingersoll-Rand. In humerous form, it gives a lot of straight information on compressor valving, and tells the story of how I-R solves the wear and impact problem.

762

Molding Technique

A technical bulletin published by Lebanon Steel, "Combining Ceramic and Investment Molding in a Single Casting", describes how the two techniques are combined (ceramic and lost-wax methods.) Very interesting illustration given is casting of an impeller blade. Copies available on request.

763

Lube Oil Book

Internal Combustion Engine Institute is offering the 6th edition of "Lubricating Oils for Industrial and Heavy-duty Automotive Engines", a 75-page listing of approximately 750 oil companies and the brands of their oil which they guarantee to meet MIL-L-2104A, supplement 1, and Series 3. Individual copies are 35 cents each, plus postage. Well worth it if you or your equipment travel.

764

Finishing Colmonoy

A technical data sheet (#T-2), released by Wall Colmonoy Corp., discusses recommendations for finishing Colmonoy hard-surfacing alloy deposits. Gives specific grinding wheel recommendations, etc., according to make and number.

765

Gasket Brochure

Garlock has just released a 24 page brochure that answers important questions on best gasket materials, best designs and how to choose.

766

DIESEL PEP

Diesel Pep keeps injectors, screens, filters and fuel pumps clean -improves combustion, disperses water, keeps fuel lines open. Diesel Pep prevents rust and acid formation, removes gum and varnish, eliminates wax and sludge—reduces engine wear, minimizes smoking. Get more pep and power . . . more cetane value . . . get DIESEL PEP!

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For more information write in No. 727

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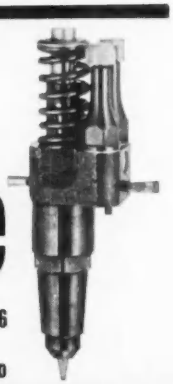

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By C. F. KLENNER Carl Klenner is a specialist at helping customers with their lubrication problems. A graduate of the Michigan College of Mining and Technology, he has been serving commercial customers since 1948. He also attended the Company's Sales Engineering School.

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